# ELECTRICAL TIMES

THURSDAY
21 DEC.
1950
SIXPENCE

A 45,000 kVA, 132/33 kV transformer, fitted with 132 kV on-load tap changer, at the Newport outdoor substation of the B.E.A.


*Transformers*

*by G.E.C.*

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON

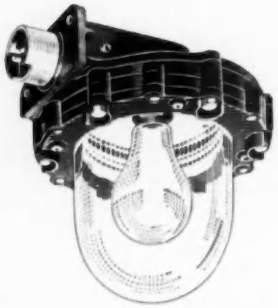
HERE IS THE

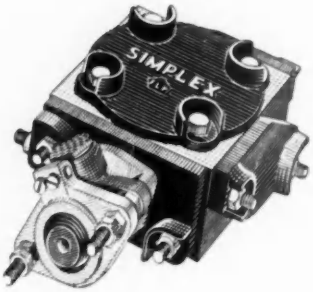
# NEW

## plug-in flameproof

## lighting FLP system

(Patent applied for)



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Complying fully with B.S.S. 229 and 889, the Simplex 'Antiflam' lighting system has been specially designed for use in mines where certified flameproof apparatus is required. It is suitable for use underground in roadways, pumphouses, sub-stations and stables

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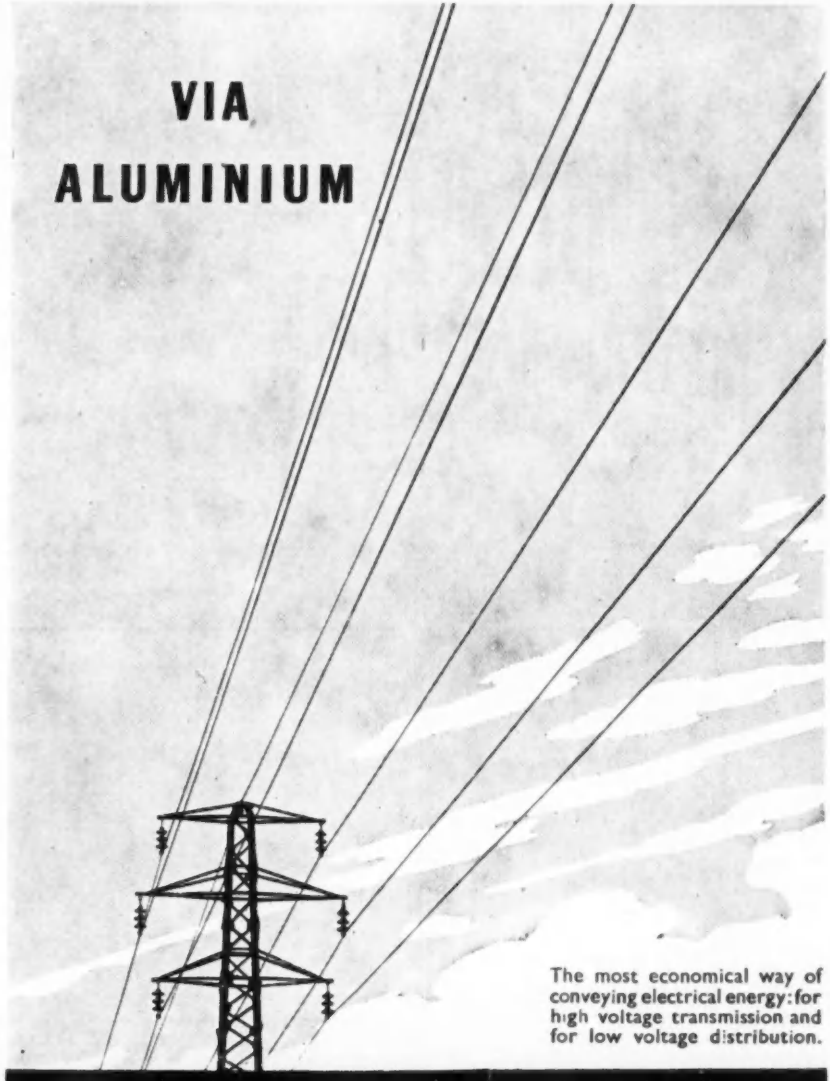
***For use in mines, railway yards, oil refineries, distilleries, paint works, chemical works, etc.***

*Write for further details:* **Simplex Electric Company Limited Oldbury Birmingham and Branches**

A TI COMPANY

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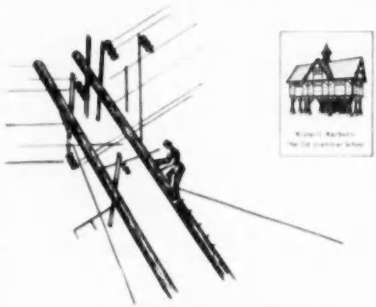

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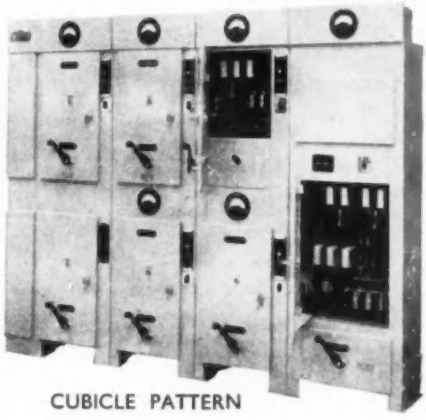
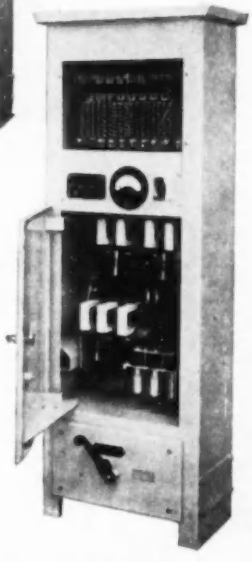


CUBICLE PATTERN

PILLAR PATTERN



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COMPANY LIMITED

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from
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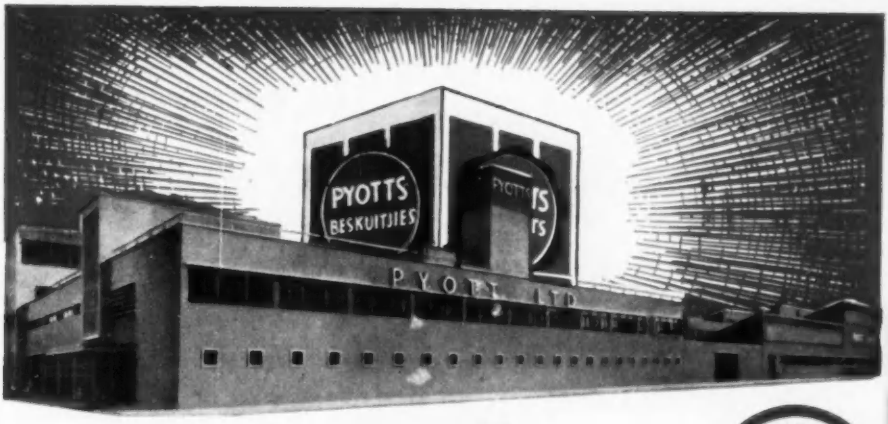

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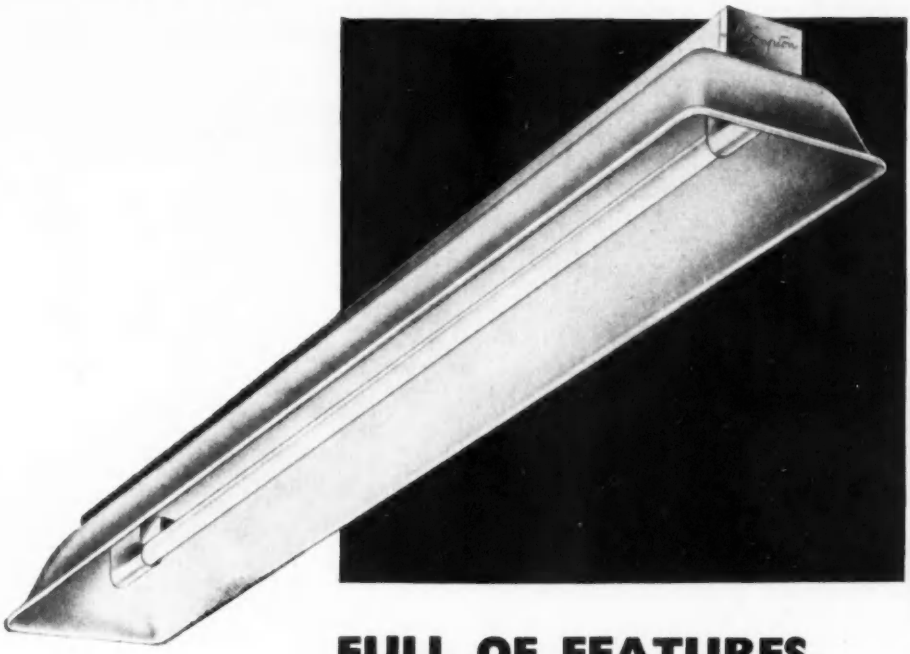

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- **LAMP,** Crompton 80w. or 40w. fluorescent tubes, single- or two-lamp patterns.
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**There is a Crompton lighting fitting and lamp for almost every purpose and a Crompton lighting engineer to help you with every lighting problem.**

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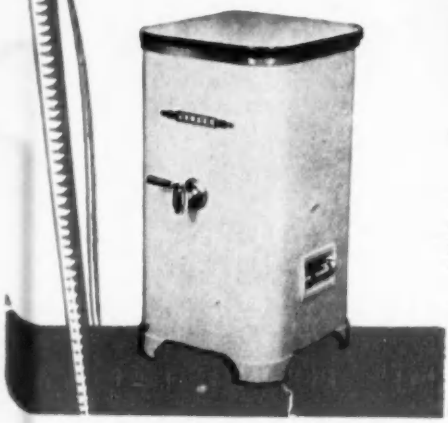

This VERSCO de-luxe "SQUARE" Wash Boiler is an example of the high standard of manufacture maintained throughout the complete VERSCO range of electric wash boilers and washing machines.

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Amperes A.C.

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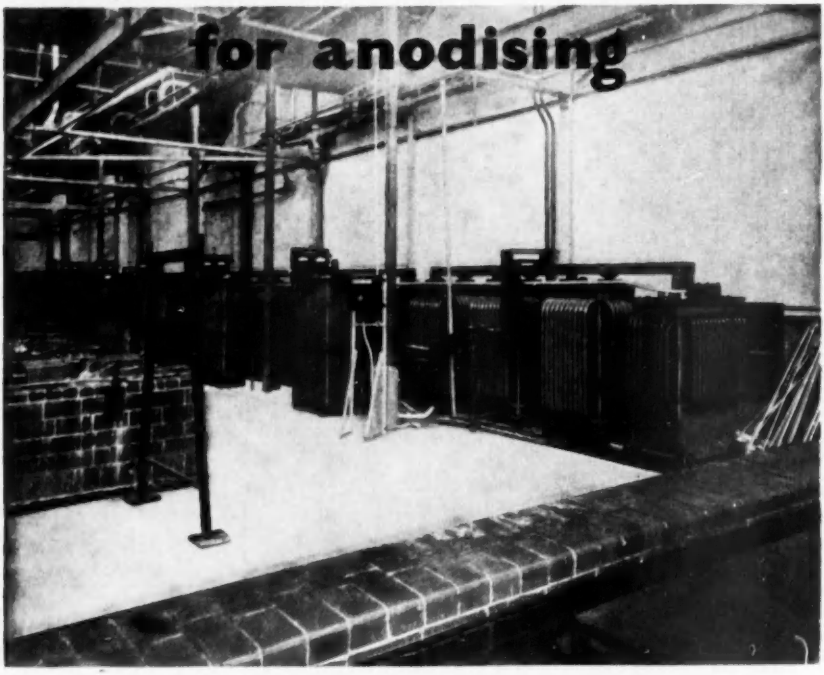


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**MAGICOAL** *fires*

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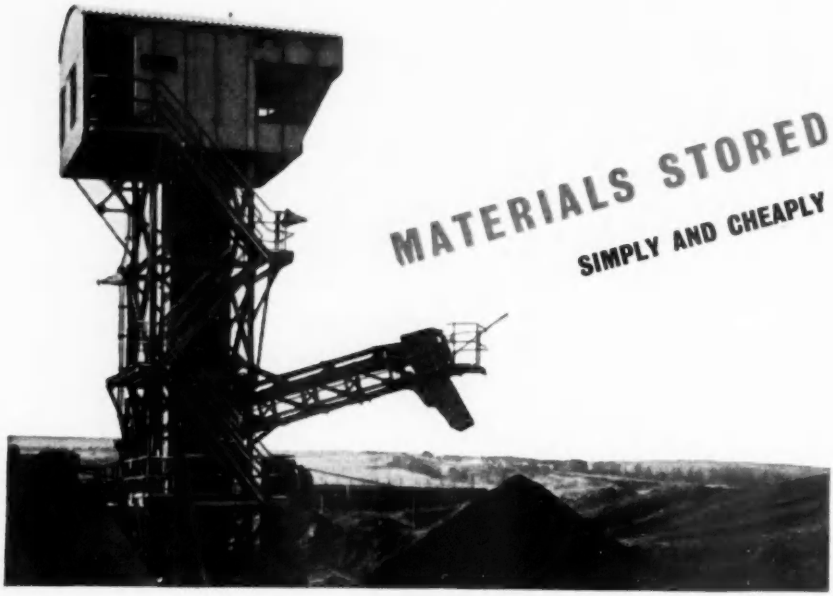

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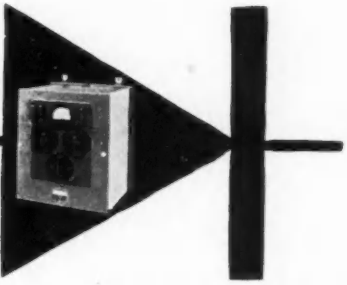

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**Selenium Rectifier Equipments** are manufactured in all sizes and types from the smallest to the largest and from the simplest to the most complicated.

Standard types for common applications are readily available.

In addition an Engineering Department is maintained to design equipments specially to customers' individual requirements :—

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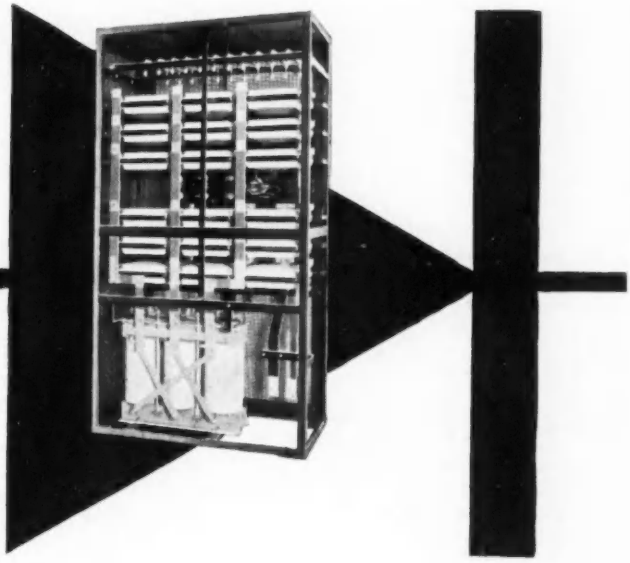

*Top illustration: Automatic Battery Charger*

*Lower illustration: Diesel Engine Starter (back view with panel removed)*

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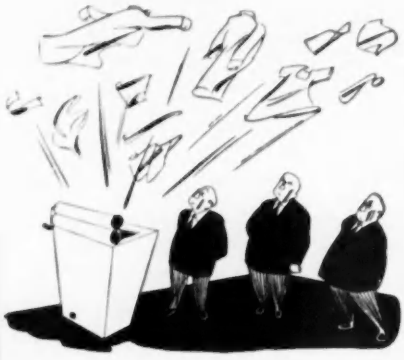

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***All Electric***
**IMMERSION HEATERS**
**OR**
**CIRCULATORS**

*Thermostatically controlled HOT WATER available at all times*

**Guaranteed for TWO YEARS**

**LOADINGS available in 2, 3 and 4 kW**

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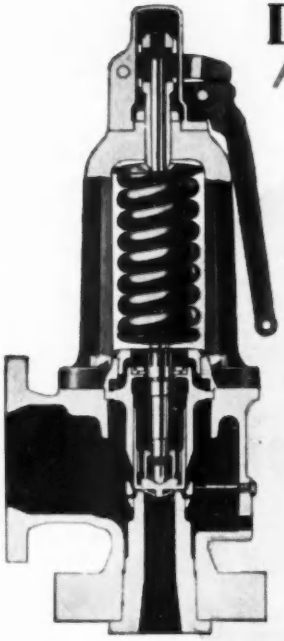
# DEWRANCE-CONSOLIDATED
## *FULL-LIFT SAFETY VALVES*



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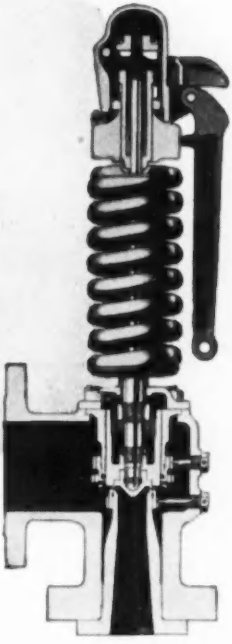
The high capacity and low blow-down of Dewrance-Consolidated Full Lift Safety Valves has recently been demonstrated by very successful high pressure, high temperature capacity tests carried out in co-operation with the B.E.A. and associated authorities.

The test proved that these valves have a greater discharge capacity than the normal Full Lift Safety Valve and therefore fewer valves or smaller sizes are required per boiler. A Constant of 44 can be used in conjunction with the formula given in B.S.S. 759 in calculating capacities. The Free Discharge Area through the Valves can be obtained from us on request.



*Dewrance-Consolidated Maxiflow Safety Valve*

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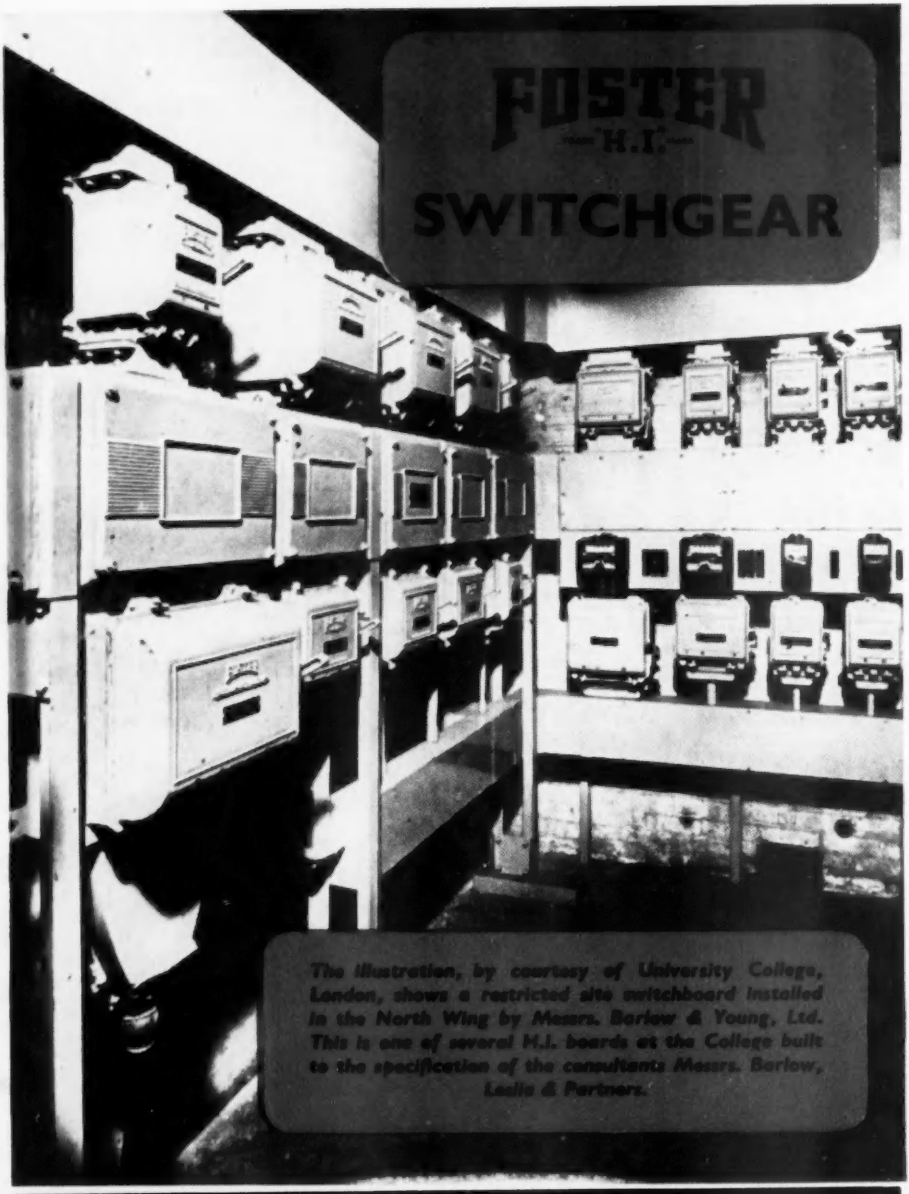


*The illustration, by courtesy of University College, London, shows a restricted site switchboard installed in the North Wing by Messrs. Barlow & Young, Ltd. This is one of several H.I. boards at the College built to the specification of the consultants Messrs. Barlow, Leslie & Partners.*

**Foster Transformers & Switchgear Ltd**

ONE OF THE IDC GROUP

SOUTH WIMBLEDON, LONDON, S.W.19

# "ENGLISH ELECTRIC" overhead busbar system

THE MODERN METHOD OF POWER DISTRIBUTION TO INDIVIDUALLY DRIVEN MACHINE TOOLS.

DESIGNED FOR EASY RE-ARRANGEMENT OF MACHINE SHOP LAYOUTS

DELIVERY—EX STOCK OR SHORT DATE

**BUSBARS** totally-enclosed metal-clad or all-insulated pattern, are produced in standard 12 ft. sections. Any length of run, a multiple of 12 ft. can be built-up on site. Power points are provided at 2 ft. intervals.

**PLUG-IN BOXES** for making connection to the live busbar at the power points, incorporate "English Electric" high-rupturing-capacity non-deteriorating cartridge fuse links.

*Write for Publication FG/114A for full details to :-*

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**overhead low-voltage transmission cable, embodies features which we can justly claim to be abreast of, if not in advance of the times. Not only do we ignore climatic extremes, we know STERLINE has a lower initial cost—is lighter in weight and is easier to handle than the "old" braided and compounded weather-proof aerial wire. Needless to say, we have made and are still making many thousands of miles of the type we now call "old", simply because we stress the importance of pleasing all cable users.**

**Full details of STERLINE will be sent on request: these will include specification, sizes, weights and prices.**

# STERLING

## CABLE COMPANY LIMITED

ALDERMASTON BERKSHIRE

TELEPHONE READING 1000

TELEGRAMS "STERLING PHONE READING":
WORKS AT ALDERMASTON AND WARRINGTON, LANCS.

# The toast—
# "Friends old and new..."

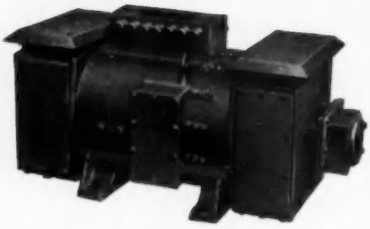
Christmas is a time when we should all lay aside our tools and ledgers. There is something else to think of and remember—the friendship and goodwill which we all enjoy between man and man. Brush have many friends—and hope to gather more. To them all we say "Merry Christmas!" *—and for their prosperity in 1951 . . .*

the best wish is from BRUSH

**The Brush Electrical Engineering Co. Ltd., Loughborough, England**

15·9 London, Birmingham, Cardiff, Manchester, Leeds, Newcastle, Glasgow, Bristol, Sheffield

# NEWTON-DERBY
## ELECTRICAL EQUIPMENT



2½ kVA Motor Alternator. Drip-proof to 45°. Motor 220 volts D.C. Output 120 volts, 3 phase, 333 cycles per second. Motor includes an automatic constant-speed governor. Weight 450 lb.

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(*Send for publication No.* 1003)

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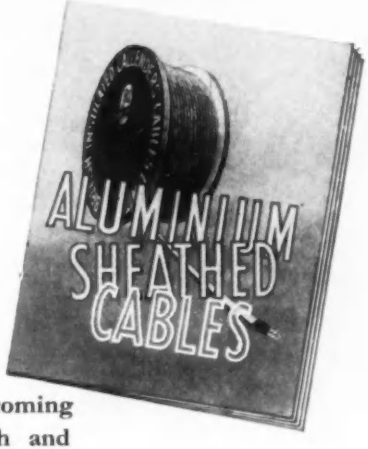


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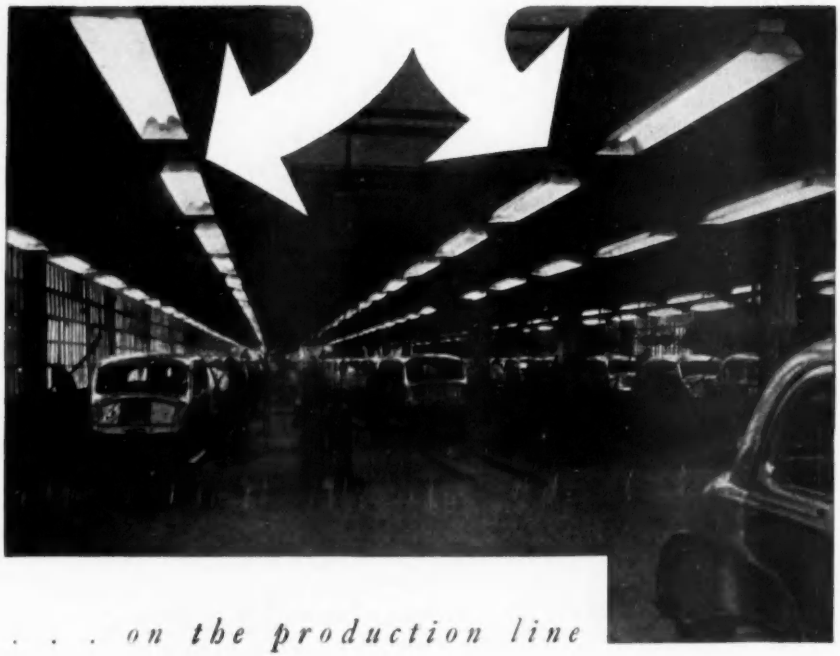

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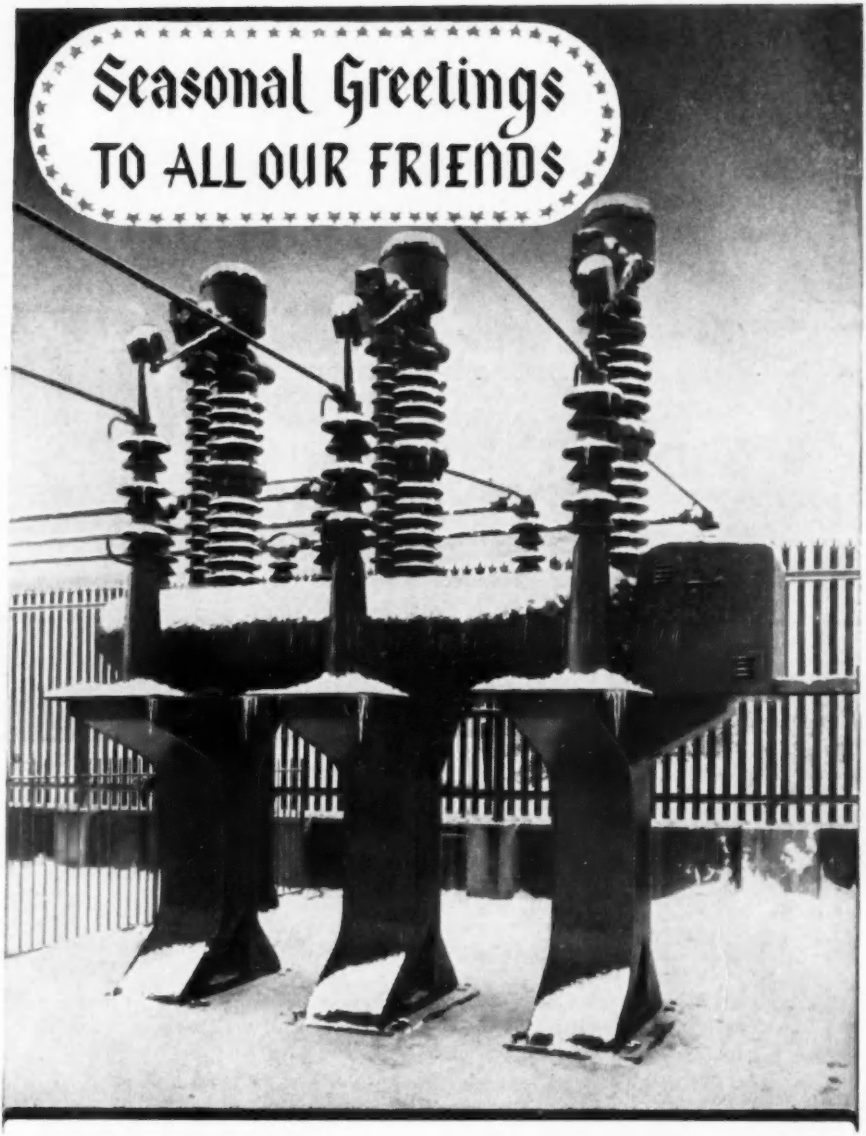


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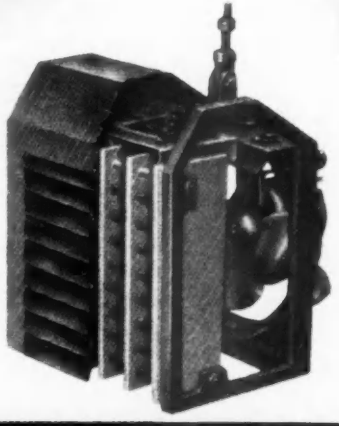

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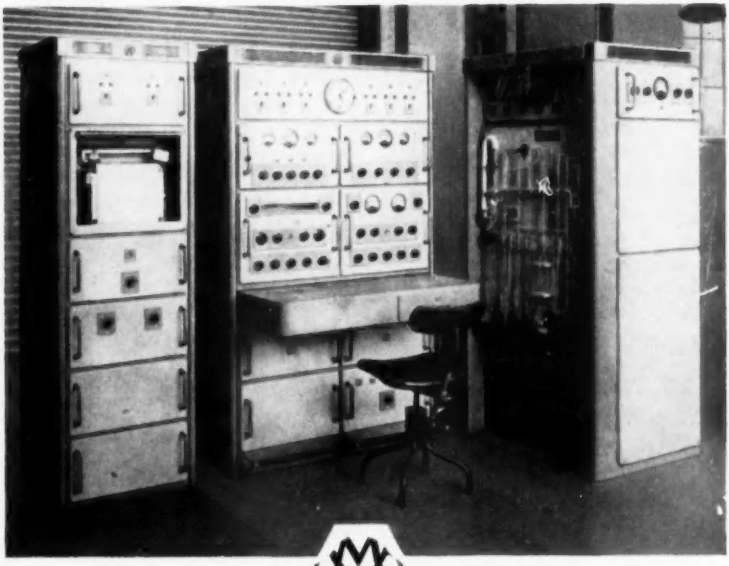

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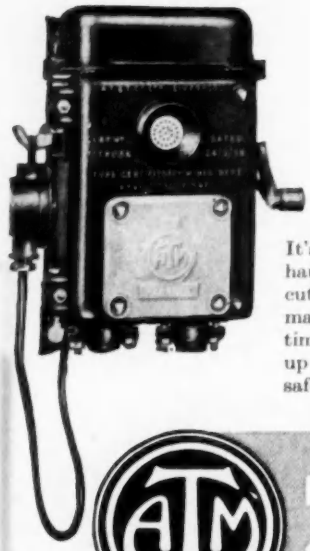

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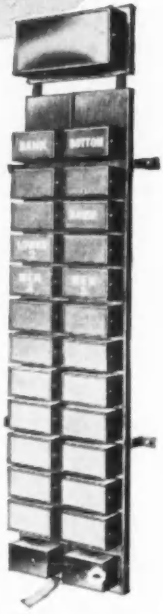

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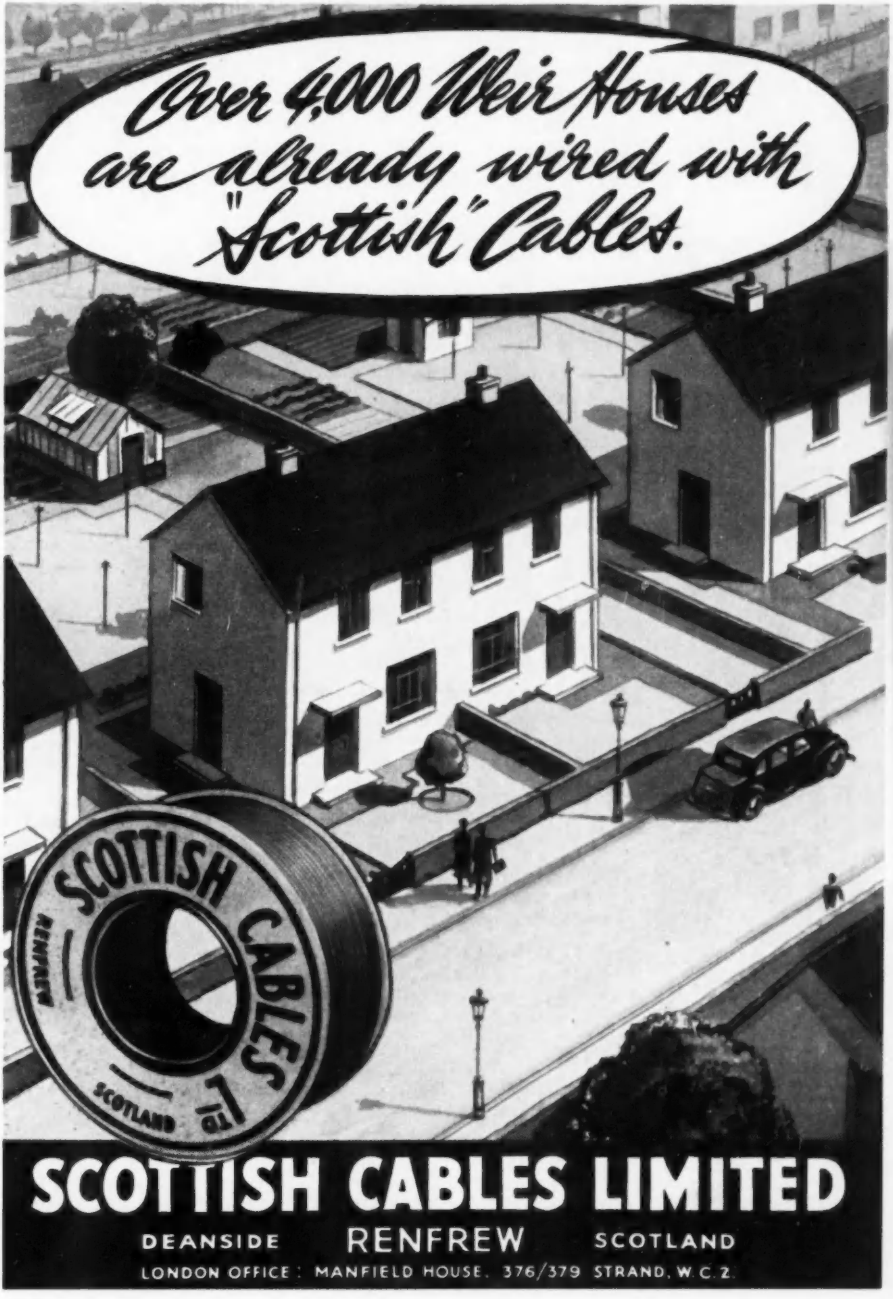
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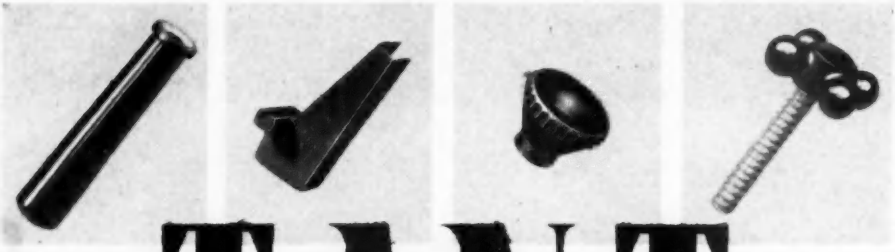

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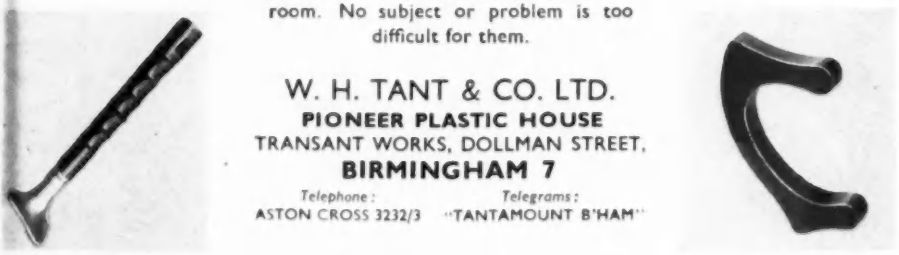

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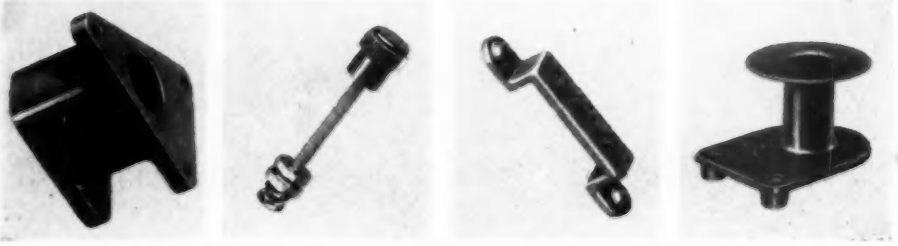

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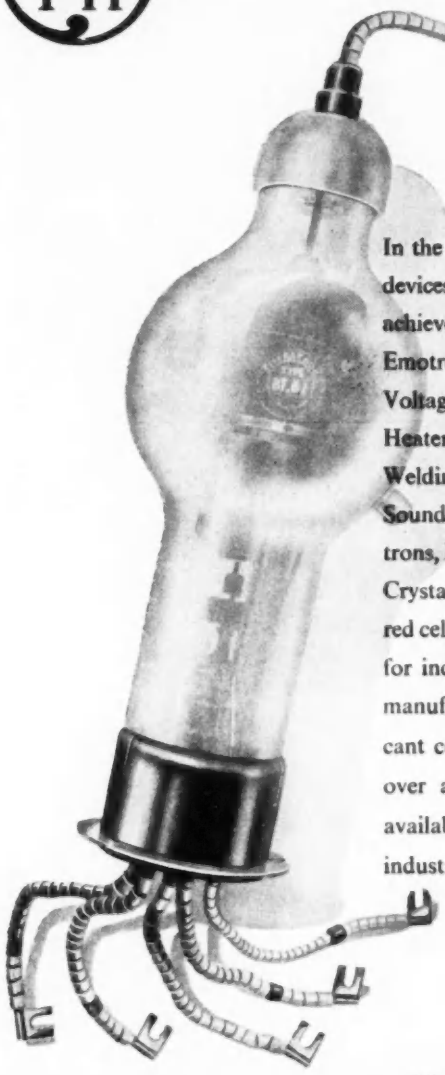

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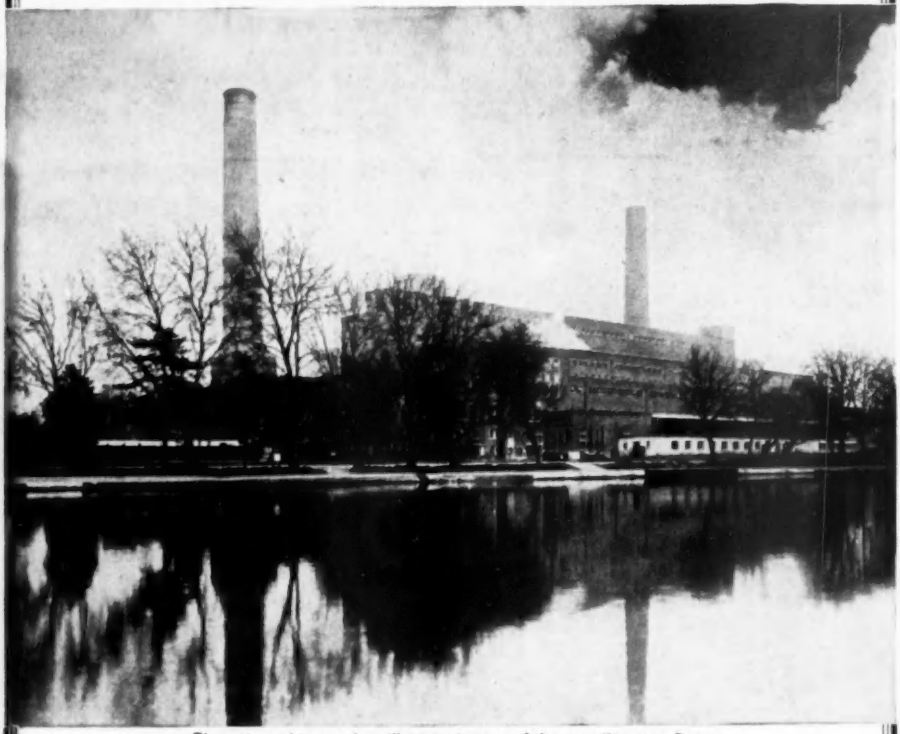

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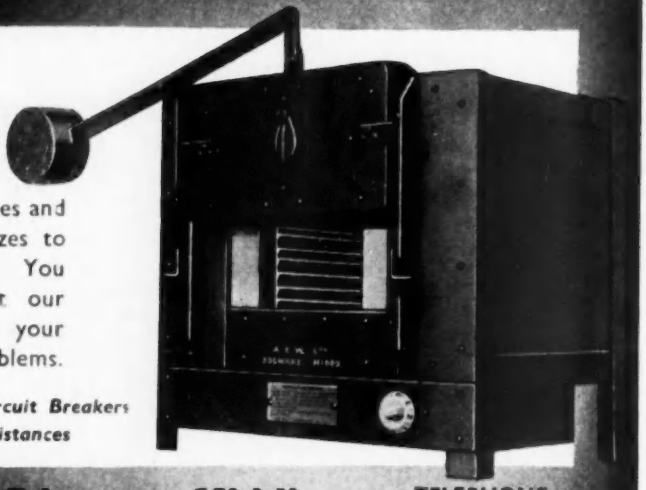

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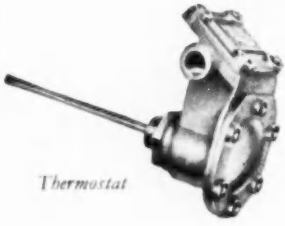

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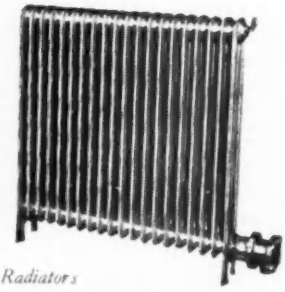

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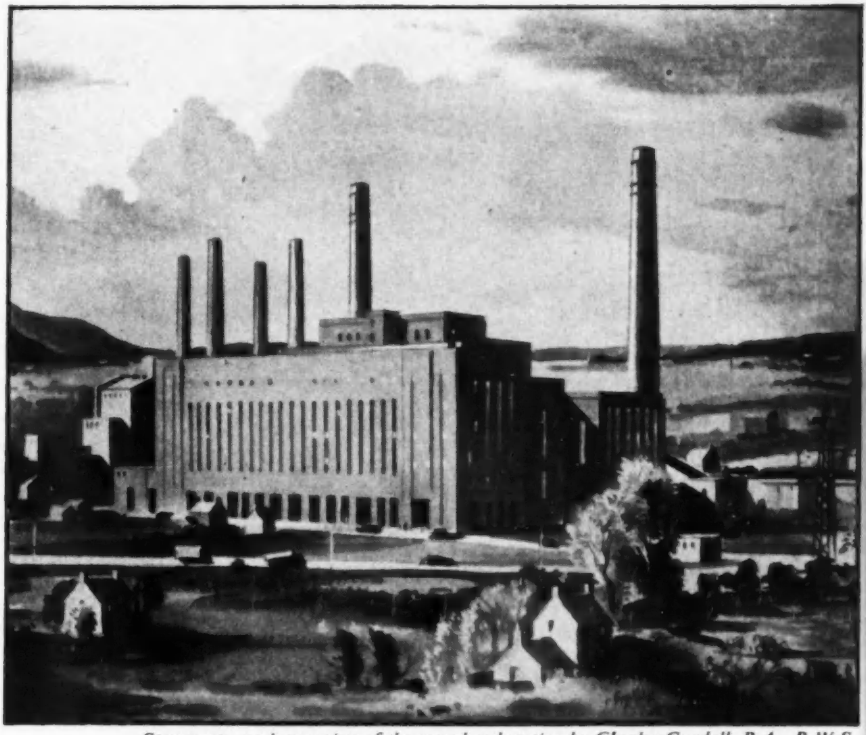

*Stourport—an impression of the completed station by Charles Cundall, R.A., R.W.S.*

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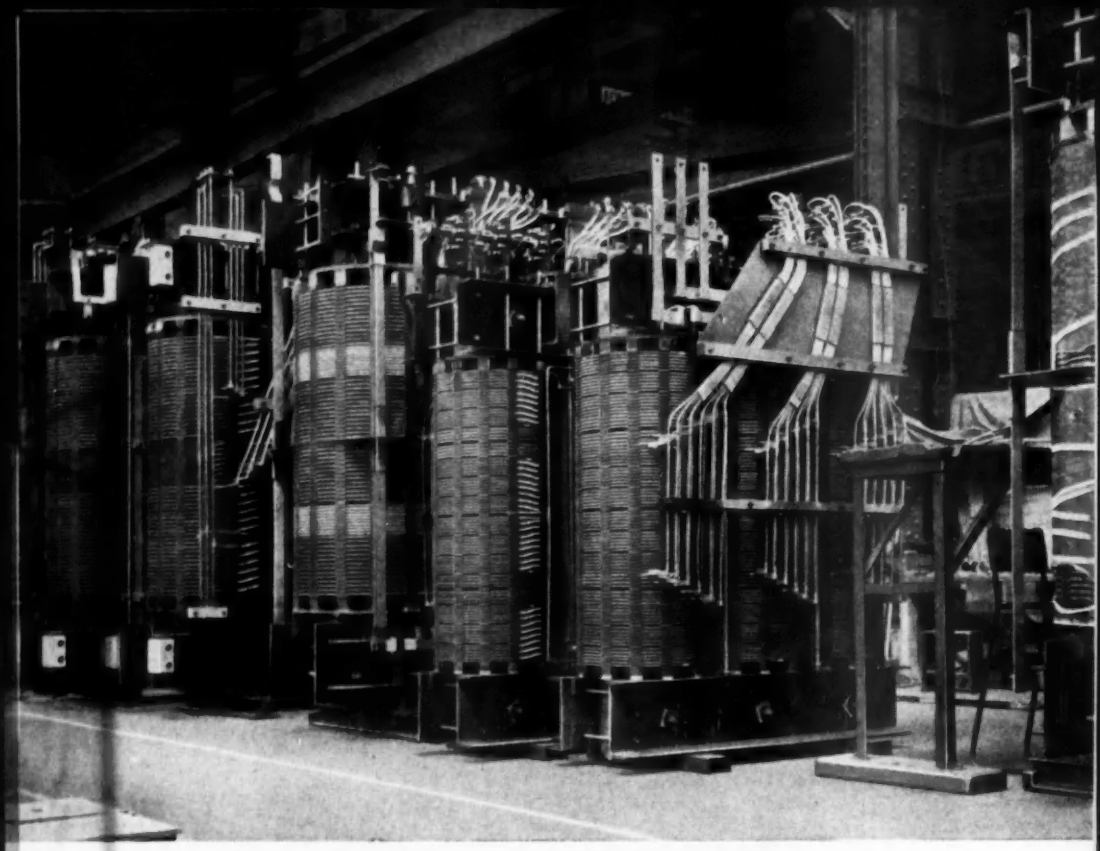

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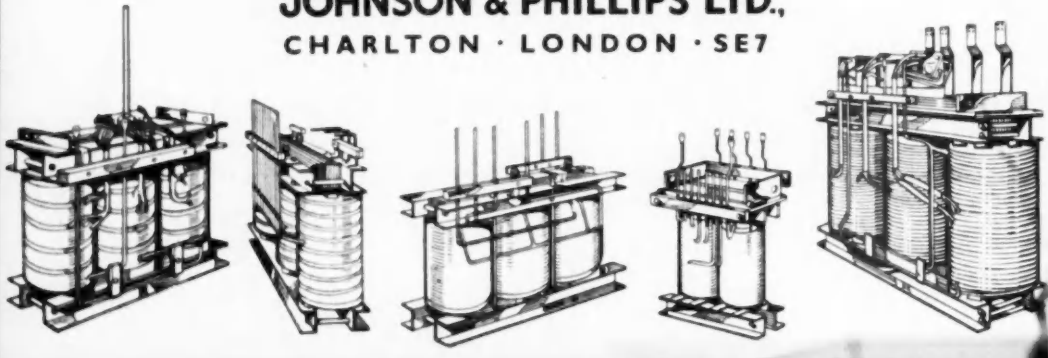

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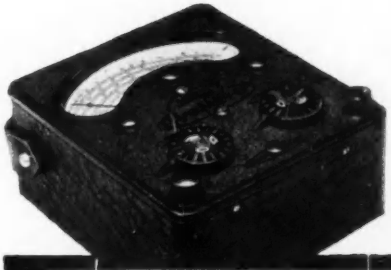

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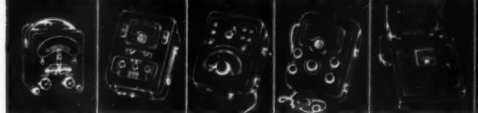

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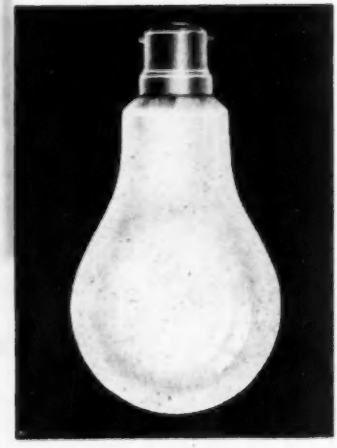


Take for example the 60 watt OSRAM coiled coil lamp. It gives 15% more light than an ordinary tungsten lamp of equivalent wattage and consumes no more electricity — Think! increased light without increased cost of running. It is always worth while specifying Osram coiled coil lamps.

A G.E.C. PRODUCT MADE IN ENGLAND

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.I

# Editorial

### *THREAT OF ACTION*

IT is nine months since the new agreement relating to conditions of employment of technical staffs was signed by the B.E.A. and E.P.E.A., but there are still many cases where re-grading in accordance with the new schedule has not been carried out. Members who have suffered some loss, perhaps indirect, consequent upon nationalisation are becoming more than anxious for a proper settlement, particularly as the agreement is retrospective to July, 1949. This dissatisfaction reached a head last week at a meeting of the E.P.E.A. London Combined Sections when a resolution was passed calling for grading of all members to be completed by January 31, 1951, otherwise the necessary 21 days' notice of a trade dispute would be given. While such a resolution is unlikely to pass the more severe eye of the E.P.E.A. Council, it does indicate the temper of B.E.A. technical staffs. Perhaps even more significant was the discussion at the meeting of the regrettable step of a possible breakaway in the London area from the E.P.E.A. The significant feature of this discontent is not that there is any basic quarrel with the B.E.A. but that the time delay in the endless gear train of bureaucracy, ignores essential human factors.

### *"... AND MAKE GOOD CHEER ..."*

FOR Christmas comes but once a year," wrote Thomas Tusser about four centuries ago. Just as the New Year seems appropriate for looking forward, so at Christmastime does one think longingly of the "good old days," if the average Christmas card be taken as an index. In pursuance of the theme that Christmas is a time for looking backwards, judging by the fondness for coaches in the snow, old inns, and Kate Greenaway costumes, we ourselves take a peep in that direction. Not to the early 1800s, since our industry is a little young for so long a stride, but to the 'eighties and 'nineties, when electricity supply was young and, not exactly frivolous, but less staid, middle-aged and law-abiding than it is at the moment. Mr. Jesty's article on the "Marauding Companies" gives us an all-too-brief glimpse of an industry that few of us ever knew; of a time when there was open competition and one changed one's electricity supply with much greater facility than changing the milkman nowadays. Times must change and we must change with them, and the methods of these early pirates would nowadays be as inconvenient —not to say embarrassing—as would the advent of armed cowboys in respectable Texan cities which have outgrown their frontier days. But there is always a fascination in the past—particularly at Christmas.

### *RESISTANCE MOVEMENT*

ANOTHER excursion into the past occurs with the diamond jubilee of the City and South London Railway last Monday. Regarding the changes wrought by 60 years of electric traction, it is interesting to note that one of the fundamentals—resistance control—is still with us, whatever else changes. Two 50 h.p. motors are not now considered adequate for propelling a train, and gearless motors are no longer favoured. Modern trains do not have glass plates in the floor of the cab so that the driver can keep an eye upon the sparking at the com-

mutator, and direct hand switching of the main circuits faded away with the huge drum controllers of the Liverpool overhead railway soon after the first World War. Magnetic and pneumatic systems of every type have come; and some have gone, but in spite of all, the principle of plain insertion and short circuiting of resistances, with many additional refinements, in London, at least, still holds the field.

### *ADVERTISING AND THE B.E.A.*

THE advertising programmes of the B.E.A. seem to be well on the way to becoming a standing cock-shy. It all started with the "Mummy forgot" poster after vesting day and is continuing full tilt against the current series "Another new power station." During the recent debate in Parliament on B.E.A. publicity, there was a good deal of criticism of the type which Mr. Robens aptly termed "cheap" but neither side of the House appeared to have an understanding of the basic reason behind these advertisements. It is simply that even if the public experience no improvement in the plant shortage year after year, at least they should be told that serious efforts are being made to improve the position. If the timing of the posters campaign resulted in their having, on some individuals, the reverse effect to that intended, it is unfortunate, but at least the B.E.A. deserves some credit for trying. However, they have little cause for complaint since they have been presented with a handsome measure of publicity at no cost, and even if the criticism has been unfavourable, better that than to be ignored, which is the last thing the B.E.A. can afford at a time when they need all the support they can obtain for their development programme.

### *THE CUSTOMER'S VIEW*

THOSE same 14 documents which reviewed the second year's work of the Area Boards, included the reports on the first year of effective activity by the associated Consultative Councils, statutory guardians of the consumers' special interests. With the activities of the area boards and the central authority now firmly in our minds, we have re-read these stories of the Lay House of the industry's organisation, looking for some clue to the effectiveness of these bodies whose creation was a corollary of nationalisation. Only one broad impression remains—the councils are the firmest of believers in electricity for all, and in these times that means support for rural development. In report after report, weighty requests are made that whatever else may be affected by cuts in capital expenditure, work to supply the farmer and the hamlet should continue unimpeded. Beyond this point, opinions and activities diverge, but it seems clear that in the councils and their district committees is being built up an informed body of men and women who can both interpret the complexities of electrical supply to the consumer, and counter unfortunate decisions of area boards, with a fluent exposition of the average man's feelings on the matter. Leaving everyone happier is their main task, but they seem to be promoting efficient working in the process.

### *SMASH AND GRAB*

STROLLING along, looking at late shop-window lighting, some time ago, we were intrigued to see an electrical and radio dealer's window protected with a trellis guard, as normally used by jewellers, upon which was painted in large letters: "Warning to Window-Smashers. This Guard is Alive at 1,000 Volts." Peer as we might into the innermost recesses of the window, we were unable to discern any conductor attached to the guard, or any signs of insulation such as one would expect to find even with 1,000 V (if there were any power behind it) from the standpoint of fire risks alone. We have a strong feeling that the notice may be there for moral effect only but, short of breaking the glass and finding out, we shall probably never know. With the increased application of science in crime, however, we look forward to the day when the enterprising smash and grab man's kit, in addition to the wrapped brick, contains rubber gloves, a neon tester, and a small earth spike.

*Meteor*

# MARAUDING COMPANIES

## They Operated Without Statutory Powers!

By E. H. JESTY, A.M.I.E.E.

IN these days, when practically no activity at all may be embarked upon without Statutory Powers, any attempt to do so might well arouse widespread indignation. Nearly 70 years ago, when certain pioneers were labelled "marauders," the situation was very different.

It was thought that the powers which the 1882 Act gave to break up streets to lay mains were essential to the conducting of a public electricity supply system. Some enterprising persons did, however, dispense with the need for them by concluding private local agreements. The Kensington Court Co., for example, obtained permission to use certain existing subways in which to lay its mains to supply low voltage d.c. Sir Coutts Lindsay's company, which had originated as a private venture to light the pictures in the Grosvenor Gallery, erected poles, and roof-top insulators, and ran single V.I.R. conductors to give a supply at 2,400 V, single phase, unearthed.

*Old map showing the surprising area covered by the 2,400 volt overhead system in 1887*

In the years 1880-82 no fewer than 147 companies were formed, ostensibly for the purposes of electricity supply; but very few of them ever did practise the art. It was to the few who did that the name "marauding companies" was applied, since they were at liberty to run a supply to all who could be reached.

In spite of the 1882 Act they could go "pirating" into areas in respect of which licences or provisional orders were held by other people. The term seems picturesquely applicable to the Coutts Lindsay system. Their men, clambering over West End roof-tops and snatching consumers from under the very noses of the "legitimate" companies in the streets below, might have been the inspiration of the West End's "cat-burglars" of more recent times. By 1887, as shown in the accompanying diagram, the network of overhead lines at 2,400 V consisted of 16 route miles of circuits extending from Regents Park to the Thames and from Knightsbridge to the Law Courts.

The Westinghouse Co. operated a high-voltage a.c. system supplied from a station in the very street from which the ELECTRICAL TIMES is now published. The Edison Co. installed plants at Holborn and Victoria, hoping to obtain Statutory Powers, but the conditions of the Act were so onerous that the Holborn plant was closed down and the Victoria one restricted to lighting the station only. The Metropolitan Brush Co. had been granted 23 provisional orders under the 1882 Act, but in 1884 all of them were

revoked and the company was liquidated.

"Earthing" was as topical a question in those days as it is today—and it is of interest to note the comments at the time when W. M. Mordey proposed to connect the mid-point of the secondary winding to earth, when it was said:

> "This has the disadvantage of putting a permanent stress on the insulation of the circuit. The chances of a fire taking place owing to contact with earth at some other point are increased, and the Board of Trade, together with most of the insurance companies, forbid this arrangement."

### *Reformation*

Before many years had elapsed, however, there occurred a complete reversal of opinion on many aspects of the problem. The roof-top marauders had reformed to the extent of obtaining statutory powers, descending to the streets, and becoming respectable undertakers. Sir Coutts Lindsay's company in 1887 became the London Electric Supply Corporation, the supply being still taken from the Grosvenor Galleries generating station, under the direction of the young S. Z. de Ferranti who, at the age of 22, was to commence designing from stop-valve to consumers terminals what was not only the largest power system of its day but one which was to be many times larger than anything yet contemplated.

The story of Ferranti's station at Deptford has been told and retold such countless times that it is not here proposed to tell it once again. It is here brought up only to emphasise the change in views on earthing. When it was proposed to use the earthed outer system for the 10 kV mains from the new power station at Deptford, expert evidence testified to the folly and danger of such a procedure. A convincing demonstration of its inherent safety was staged when Mr. Kollé safely cut through a Ferranti main carrying current at 10 kV without injury to himself or anyone else.

Following the use of concentric main cables on 10 kV, the principle was extended to the 2·4 kV mains, and many miles of the overhead single V.I.R. cables were taken down and re-stranded by the makers into V.I.R. concentric cables with a braided finish. These were pulled into cast-iron pipes and, incidentally, many of them gave more than 40 years' trouble-free service.

### *Commercial Methods*

The methods adopted by the early companies certainly displayed a healthy spirit of competition, and it was a commonplace for the commercial staff and the engineers to solicit a change of electricity supply as though their product could be delivered in bottles, and vigorous sales promotion campaigns were carried out with hotels, restaurants, clubs, and the aristocracy whose town mansions were not then converted into clubs, flats and offices. A record book which has been preserved, labelled "Hotels, Restaurants and Nobility" contains this letter :—

> *I beg leave to ask your perusal of the enclosed circular which gives a brief description of our system and as we have a distributing main in close proximity to your residence, I trust that, in the event of your requiring a supply of electric energy, you will favour this Corporation with your order.*
>
> *We are prepared to connect and supply current within a very few days after receipt of instructions. I am confident that our light would give you perfect satisfaction, and the terms of this Corporation will be found to compare very favourably with those of other Supply Companies.*
>
> *In view of the recent reductions in charge, electric light has now become practically as cheap as gas.*
>
> *I enclose a directed post-card and on hearing from you, shall be pleased to furnish you with any further information you may desire on the subject, and will have pleasure in keeping any appointment you may be pleased to make.*
>
> *Trusting to receive your favourable reply,*

This particular letter was sent to 392 of "the nobility," although the book contains no results of its pulling power. Similar letters sent to hotels and restaurants are however, recorded, with such comments as, "They do not appear disposed to make any change." "They decline to adopt electric light," and, occasionally, "Favourably inclined. They have given the ——— Co. notice to disconnect on the 25th

*Ferranti 2,400 volt cellular distribution gear which operated in Trafalgar Square sub-station from 1891-1933*

March," with one gem which says, "They are at present not inclined to change owing to revision of rates by the —— Co."—proving that their competitors were by no means devoid of competitive instincts themselves. . . . Happy days !

### *Trafalgar Square*

The Trafalgar Square substation was opened in 1891. By this time the Grosvenor Galleries station had become a substation, fed from Deptford.

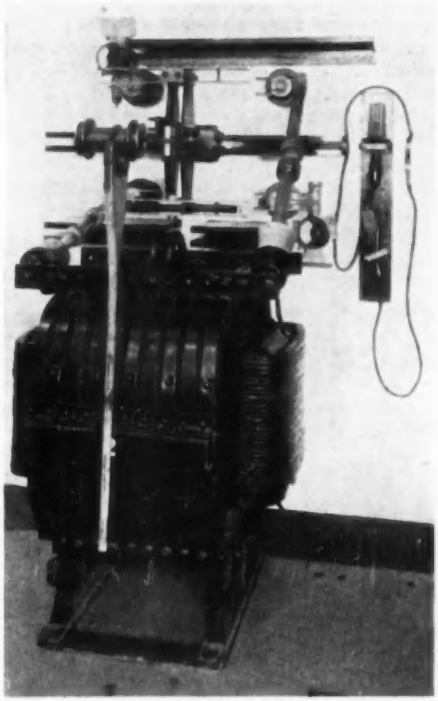
One of the transformers is shown in the accompanying illustration, with its associated switchgear. This consisted of a steel bar jutting out at right angles to the wall, upon which slid a body carrying contacts for both primary and secondary circuits, the secondary being the lower one. Only one pole of both primary and secondary was switched, of course, since both systems operated with one pole earthed. The fuses can be seen in the illustrations, both 10 kV and 2·4 kV consisting of long porcelain tubes having glass inspection windows in the middle, through which the tinned copper wires could be seen.

The secondary side of the switch had extensions on the fixed contacts and spring arcing contacts on the moving unit, to ensure that the transformer was only switched in on load. Previous to fitting these, much trouble had ensued due to surges. Some idea of the quality of workmanship put into this apparatus may be obtained from the fact that the surviving specimen, although nearly 60 years old, can still be moved by the pressure of one finger, without the aid of the long wooden handle which was the normal method of operation.

The 2,400 V supply was distributed by an early type of cellular switchboard, shown opposite. Each circuit was separated from its neighbours by insulating barriers, and the switch consisted of a long lever pivoted about the middle, and having spring "flapper" contacts at each end. An ammeter was directly connected in each circuit. Protection was by means of fuses, similar to the transformer fuses, which (some 4 ft in length) were located in corresponding compartments at the rear of the board. Twin clips were provided for each circuit, so that the rating of the circuit could be adjusted by changing the fuses *under load*.

### *Rough and Ready*

Substation operation with this type of gear was definitely not an occupation for one given to day-dreaming. One's mind had to be definitely on the job. There was no safety interlocking—if a circuit was being worked on, one looped a label over the handle and handrail, to prevent it being closed. Sectioning of the busbars was done by removable links—one just leaned over the handrail and pulled the link out. If through carelessness, the wrong link was pulled . . . it was just too bad. In any case, links not to be opened were marked by dropping an insulating tube over the handle, so there was no excuse.



*Ferranti 10/2·4 kV transformer and switchgear showing the plug-in earthing device at right*

Although operations gradually became more orthodox, or rather their proved rightness was establishing an orthodoxy, much was still *au fond*, carried out by intelligent guesswork. It was common practice for the attendant at the Trafalgar Square substation to telephone the Engineer's office to report the failure of a 2,500 V circuit fuse.

The engineer would then instruct the attendant to leave the telephone receiver off

from its hook, and to insert a test fuse (usually one strand of 40 gauge copper wire) in the circuit which had failed. On the closing of the switch by the attendant the engineer would judge, from the volume and nature of the bang which he heard over the telephone, whether the original failure could be attributed to a sudden overload, or to a fault on the main, and either one put a larger fuse in, or one lashed the handle and the mainsmen got to work.

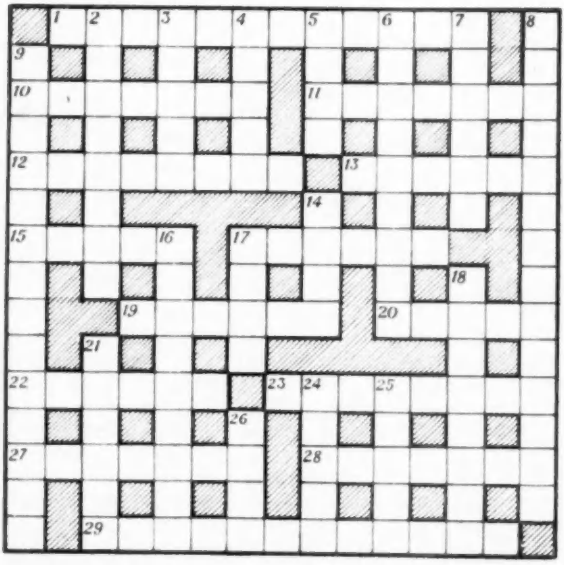
[NOTE.—*It is good to realise that relics of these days are not all lost. By the foresight of the late G. W. Partridge, and with the authority of Mr. D. B. Irving, the chief engineer of the London Board, a portion of the Trafalgar Square substation was preserved intact as a memento of a great pioneer, and the original switchgear and transformers can be seen, with old mains records and maps. Visitors to the Festival are expected to be particularly interested.*—ED.]

# PUZZLES

1 Who was it who discovered that an electric current applied to a frog's leg produced a convulsive kick?
2 What is the oldest known book on electricity?
3 What units are (a) the Siemen; (b) the Slug?
4 Who invented the first really powerful sound amplifier?
5 What is a "bit"?
6 Who made the first magnetic recorder, and what was it called?

(*Answers on page 986*)

## CHRISTMAS CROSSWORD



### ACROSS

1 Static hydro-heat extractor (7, 5).
10 Repeat (7).
11 Severe (7).
12 Little Charles with a shilling in his tie (8).
13 "Till Hell itself ——s over" (6).
15 Units or components (5).
17 "Dick Barton" is a this (6).
19 Too much in ballraces, and they run hot (6).
20 "A little —ing is a dangerous thing" (Pope) (5).
22 Puts up a machine (or a structure) (6).
23 Use a —— edge for checking flats (8).
27 Food preparation location (7).
28 Left me on my own-i-o (7).
29 Left dead (12).

### DOWN

2 Functions (8).
3 None lesser (5).
4 Wants (5).
5 Cut off (4).
6 Source of h.e. power (9).
7 Water turbine blades or buckets (6).
8 "—— in the stroke of yon connecting rod" (Kipling) (14).
9 When this 5s a circuit is 29 (7-7).
14 Let loose (4).
16 Extends (9).
17 Sitting place (4).
18 French for geometrical touchingness (8).
21 In modern stations the feedwater is this before injection (6).
24 Goods or passenger (5).
25 Old Father —— the Law (Shakespeare) (5).
26 The A of A.D. (4).

# *Three-Phase 230 kV Transformers for Finland*

## No. 1 of Five units by Ferranti Ltd., believed to be first ever exported

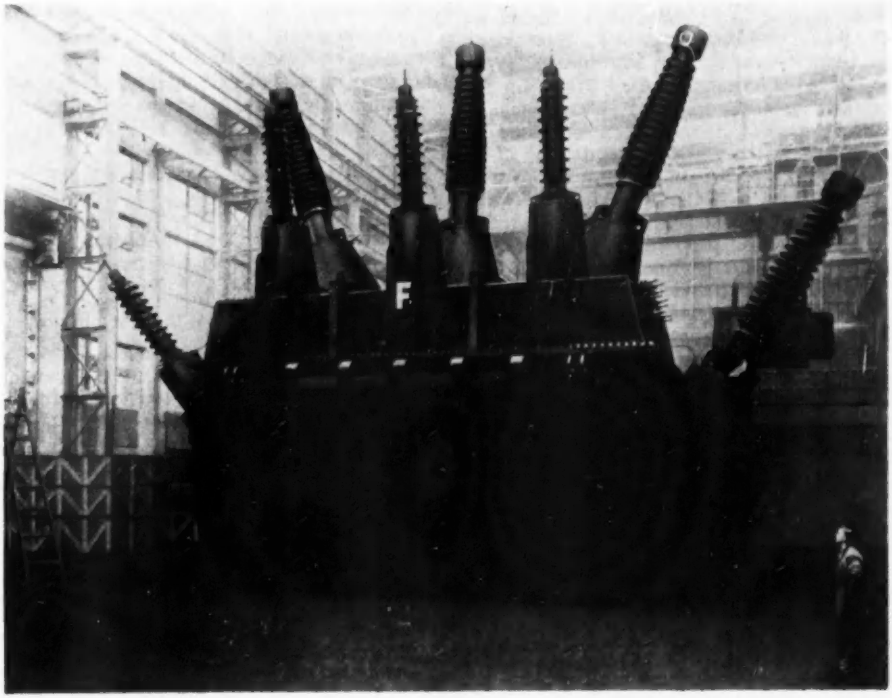
THE transformer shown in the photographs is the first of five similar units which Ferranti Ltd. have on order for Finland and is for installation at the Imatra Power Co.'s Pyhakoski Generating Station.

### *Technical Data*

The transformer has three windings rated respectively for 64/64/32 MVA, the voltage ratio's being 115·5/231/10·5 kV between phases. Both the 115·5 and 231 kV windings are star connected with the neutral ends fully insulated. The 32 MVA 10·5 kV winding is used to supply three 10,000 kVA reactors to compensate for the capacitive load of the 220 kV transmission lines. The transformer is rated for the full loadings to be applied on all windings simultaneously. Tappings are provided on the 115·5 kV windings for off-circuit changing by hand operated tapping switches.

### *General Arrangement*

The transformer is designed to British Standards, the pressure tests being in accordance with Swedish Rules. To meet these the 231 kV windings were designed for and tested at 530 kV, 50 c/s, which is the highest 50 c/s test voltage which has been applied in this country to a transformer, either single-phase or three-phase, from a separate source. The



*Some idea of the size of the transformer may be gained from this photograph, taken in the works, of the fully assembled unit shown in comparison with the engineer in the foreground*

*The transformer cores removed from the tank to show the winding arrangement*

test voltage on the 115·5 kV windings was 275 kV 50 c/s.

The transformers are of the B.S. ON/OFB type, cooling being provided by forced oil circulation and two banks of air blast cooled radiators adjacent to the transformer. With the forced oil circulation, the Ferranti directed oil flow is used, in which the cooling oil entering at the bottom of the tank is not discharged into the general column of oil but is led directly into the end clamps. From these the oil feeds a distribution chamber which delivers oil to the axial ducts of each winding in predetermined proportions.

Axial ducts are provided with oil directing barriers so that the oil flows alternately from the inner to the outer duct, and then from the outer to the inner, through the radial winding ducts. This positive flow through the radial ducts reduces the difference in temperature between the windings and oil, and the rise in oil temperature between inlet and outlet is uniformly low in all windings, the difference between the mean oil temperature and maximum oil temperature in the transformer tank being only 2° or 3° C. at full load. In consequence the hot spot temperature of the OFB transformer is only 3° or 4°C higher than the temperature as measured by resistance of the windings.

The rating of the transformer when operating ON is 66·2/3% of the rating OFB.

The transformer in its tank complete with bushings but exclusive of the radiator banks is 30 ft. high, 35 ft. 3 in. long, and 11 ft. broad, the weight including oil being 176 tons. The service dimensions including radiator banks and cooling gear are 30 ft. high, 51 ft. 3 in. long, and 28 ft. broad.

Although there is no difficulty in lifting the complete transformer at the Ferranti factory, the present limit in lifting capacity at the port of Abo, Finland, and of rail transport in Finland, is 90 tons, and it is necessary to dismantle the transformer for shipment into units which do not exceed this limit. The core and windings are shipped in a special transport tank built round them and hermetically sealed, and the actual service tank, and service cover are each shipped separately.

### *Transport Difficulties*

Special routing has been necessary to avoid bridges between the works and Manchester Docks where the transformer will be loaded for Finland, and at one spot it will be necessary to raise the trolley wires where the route to the docks crosses the route of a trolley bus service. The shipping of the main tank and service cover separately was done in order to clear G.P.O. telegraph wires en route to the docks.

In Finland the journey from Abo to Pyhakoski will be made by rail using special trucks to suit which the transformer tank has been shaped. The final tanking and assembly with the necessary vacuum filling will be carried out on site by Ferranti engineers.

## ANSWERS TO PUZZLES ON PAGE 984

1 Volta. Galvani imagined that the current was produced in the leg itself.

2 Robert Boyle's "Experiments and Notes about the Mechanical Origin or Production of Electricity" (1675).

3 (a) Unit of conductance, mho. Suggested earlier as a unit of energy, watt-hour.

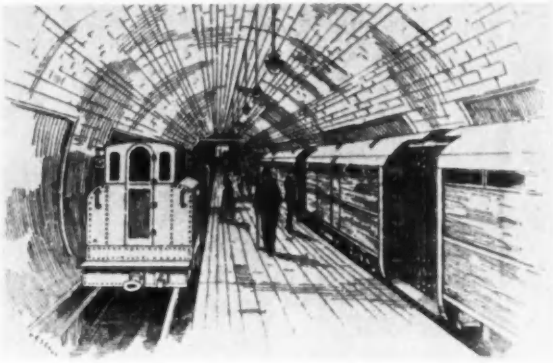
(b) The engineer's unit of mass.

4 Sir Charles Parsons, whose "Auxetophone," operated by compressed air, gave a sound range of some three miles. A form of this machine, known as the "Stentorphone," was installed at Oxford Circus station in the early 1920s.

5 Shortened name for a binary digit. A calculator is said to have a capacity of so many "bits."

6 Valdemar Poulsen's "Telegraphone."

1890



1950

*Centre is seen*

*Stockwell station 1890*

# World's First "Tube" is 60 years old

## Diamond Jubilee of City & South London Line occurred this week

THE opening of the City and South London Railway on December 18, 1890, marked the start of a new era in urban transport. It was the first electric tube railway in the world and ran from King William Street to Stockwell, a distance of 3¼ miles. The company was incorporated on July 28, 1884, and, despite keen opposition, was authorised by Parliament to construct a "double subway" from King William Street to Elephant and Castle and subsequently, by an Act of 1887, to Stockwell.

Work on the cast-iron lined tunnels began in 1886 from a shaft near Old Swan Pier, and the length of tunnels under the river was constructed first, being completed by the following summer. The remaining lengths of tunnel were then completed in various stages from shafts sunk at the Monument, St. George's Church, Elephant and Castle and Kennington.

They were of 10 ft 2 in. internal diameter as far as the Elephant and Castle, and 10 ft 6 in. from there on to Stockwell, the variation being the result of the original proposal to use cable traction—the larger diameter being to allow for greater speeds on the straight part of the line.

Six stations were constructed, at King William Street (later closed and replaced by Bank), Borough, Elephant and Castle, Kennington, Oval and Stockwell. Each station, with 200-ft long wooden platforms lit by gas, was equipped with passenger turnstiles and two lifts.

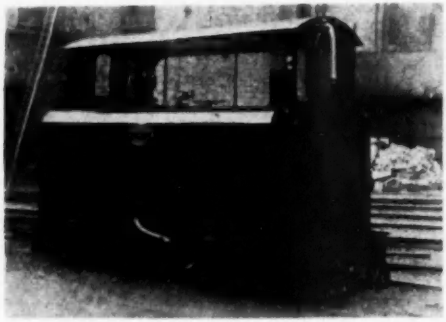
When the proposal to use cable traction was abandoned in favour of a three-rail electric system, the type of electric locomotive decided upon was the design of Dr. Edward Hopkinson, of Messrs. Mather and Platt. The locomotives, each weighing 10 tons and equipped with two 56 h.p. motors, were capable of 25 m.p.h. and were notable in being the first to have armatures built directly on the axles, thus having no intermediate gearing.

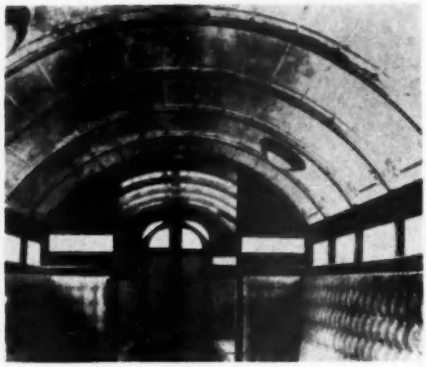
### *Rolling Stock*

The service started with 14 locomotives built by Mather and Platt, and 30 coaches built by the Ashbury Carriage and Iron Company, made up in three-car trains. Each coach had two facing longitudinal seats for a total of 32 passengers, so that the number of seats per train was 96. For purposes of comparison, a Northern Line seven-car train today seats 288 persons. The bogie frames of the cars extended beyond the ends of the wooden bodies in the form of a semi-circle and acted as buffers (no headstocks being provided on the bodies), whilst on them were built the intermediate platforms with latticework iron gates.

Each car was lit by four 16-candlepower lamps and smoking cars were provided, one to each three-car train—but not for ladies, who were forbidden to travel in them.

It is interesting to note that although the original line had no physical connection with any other railway nor rose to the surface, the repair depot at Stockwell was in the open. Empty cars and locomotives were hauled by





*Above is seen the first of fourteen 10-ton locomotives built by Mather and Platt. These were capable, with three-car trains, of a maximum speed of 25 m.p.h. Right: The interior of one of the famous "padded cell" cars built by the Ashbury Carriage and Iron Co., with which the service commenced*

a steam-operated winding engine up a steep incline (1 in 3½), although a 20-ton hydraulic hoist was later installed for the purpose.

During 1891, the first complete year of operation, 5,363,000 persons travelled on the 3¼-mile length of line.

### *Extensions*

The first addition to the original scheme was the extension to Moorgate, opened in February, 1900. This formed part of an extension to the Angel, Islington, authorised by an Act of 1893 which gave powers also for the replacement of the original King William Street Station by a station at the Bank and for the erection of a station near the Southwark end of London Bridge. The line linking these two new stations began at a point north of Borough Station and proceeded under the Thames east of London Bridge, thus obtaining a better approach to the City than that afforded by the original tunnels west of the bridge.

The extension from Stockwell to Clapham Common, authorised under the 1890 Act, was opened in June, 1900, and that to the Angel in November, 1901. In 1903 powers were obtained for projecting the line from the Angel to Euston, this section being opened in May, 1907. In the same year were introduced the first all-steel cars, manufactured by the Brush Electrical Engineering Company.

In January, 1913, the City and South London Railway came under the control of the Underground Group, who immediately obtained powers for the complete reconstruction of the line and also for effecting a junction with the Hampstead Tube at Camden Town. The 1914-18 war delayed the scheme and the work of reconstruction did not begin until Aug. 9, 1922.

The northern section of the line—between Moorgate and Euston—was closed entirely, and by day and night working the completion of work on this section was made to coincide with both the inauguration of the Camden Town junction with the Hampstead Tube and also the extension of the latter from Golders Green to Edgware. The reconstructed, re-equipped line was restored to operation on April 20, 1924.

Work on the southern section—between Moorgate and Clapham Common—also started on August 9, 1922, but proceeded by night only until November 27, 1923, when train services were withdrawn and work speeded up so that the City and South London Railway was reopened as a whole—virtually a new line—on December 1, 1924.

The works had entailed enlargement of the old running tunnels to the standard diameter of 11 ft 8¼ in., and their re-alignment in places, lengthening of station tunnels to 350 feet, modernisation of the original stations, installation of the fourth-rail current system, provision of automatic signalling and last, but far from least, provision of multiple-unit stock in place of the earlier locomotive-hauled trains.

In 1926 the extension from Clapham Common to Morden was opened and, at the same time, a short link brought into use between Kennington and Charing Cross to provide a through route to Edgware and Highgate via the West End as well as the City.

Today the former City and South London Railway, with the old Hampstead Tube and the Great Northern and City line, form the Northern line, having a total mileage of just over 40, including the longest continuous tube tunnel in the world, some 17¼ miles, between a point south of East Finchley and Morden.

# Problems and Practice

## IN ENGINEERING

### *Filings and Fields*

RECENTLY a 3 h.p., 3 phase, squirrel cage, induction motor, open type, belt coupled to a grinding machine, refused to start on its manually-operated "star-delta" starter, although this machine had been running continuously for some considerable period. Electrical tests on the wiring, the starter, and the motor did not show any defects. The motor and machine bearings were "free." It was found, however, that if the starter was switched direct to the "delta" position, the motor would start and run even under load conditions.

To eliminate various possibilities the motor, star connected, was supplied directly from the mains, thus temporarily eliminating the starter. This test was unsuccessful in starting the motor and it was therefore concluded that the fault lay in the motor.

At this stage the 3 h.p. motor was taken out of service and replaced by a spare 5 h.p. one of similar construction. The connections were returned to normal and it was found that this 5 h.p. motor started and ran normally.

Four days later the 5 h.p. motor suddenly developed exactly the same symptoms.

The 3 h.p. motor was taken into the test department, its windings connected in "star" and supplied direct from the mains. It was found to start and run normally. This was surprising until it was discovered that if the motor was turned upside down—its normal running position—the fault symptoms recurred. Careful inspection revealed that immediately the power was switched on, the steel dust particles inside the motor took up a strategic position in the air gap. On removing the rotor from the stator and again switching on, the steel dust particles gave the most convincing demonstration of a rotating magnetic field that it is possible to imagine, as they formed a visible whirlwind of dust centrally disposed inside the stator, and on switching off, the whirling cloud of dust immediately disappeared.

The failure of both these motors to start can probably be explained either by the steel particles forming a magnetic shunt in the air gap, or by their clustering together, while the stator is energised, and mechanically locking the rotor to the stator. The fact that both motors would start and run in "delta" was probably due to the increased starting torque available.

The 5 h.p. motor, still on site, was thoroughly blown out with compressed air and returned to service.

P.S.—The totally-enclosed motor for this machine *is* now on order!—*V. E. C.*

### *Cable Holds Charge*

I WAS instructed to hook up a temporary 3-phase and neutral supply to a 4-core underground cable of 19/·083 in. diameter and 90 ft in length, feeding a new building for the purpose of testing a pump driven by a small f.h.p. motor, and to give the use of a few lights. The heaviest cable at hand was 7/·044 in. v.i.r., and the load being in the nature of 5 or 6 amps it was deemed permissible to use it. After connecting temporary supply to a nearby distribution board, I inserted the fuses with the circuit open, and at the moment of insertion I noticed a small arc which led me to suspect a fault in the cable. A test with the Megger indicated infinity in each case between phase and earth and between phases. The explanation of the arc proved to be a capacitive effect of the underground cable being responsible for the absorption of a slight charge from the mains.—*W. Adam.*

### *False Alarm*

SOME time ago, I was instructed to carry out work at a large furnishing stores, which consisted of connecting into a new fuseboard the various circuits which had been added to the original installation from time to time, but which had been terminated in a switch-fuse in each case, until the number of switches at the meter position had become both unsightly and puzzling to anyone trying to locate a blown fuse. The work of bringing the circuits neatly into the fuseboard was best done in this case by using joint-boxes and c.t.s. cable, and I rather prided myself that, at the conclusion of the job, I had made quite a presentable and sound "change-over" from something near chaos to order. And so it was something of a blow to be informed, on the following day, that our customer had telephoned on the previous evening to say that there was a strong

smell of burning rubber in the basement, and would we investigate at once, as the work I had done was suspect?

With apprehension, I duly presented myself at the stores, ready to look for the source of the trouble in my work of the previous day, and to bear the disfavour of the customer's manager. However, it was with apology for having put me to the trouble of calling that the manager explained that, after telephoning, it had been found that the "burning-rubber" smell had been caused by the short lengths of cable and rubber sheathing which I had swept up and put on the coke for the central heating plant, burning in the furnace in the basement, where it had been shovelled when "banking-up" for the night.—*S. T.*

### *One Phase from Three*

A FRIEND of mine—a competent maintenance electrician—was engaged in "cleaning up" some installations which were of a shoddy or semi-temporary nature, in his factory. One in particular was the feed to a fractional horse-power 3 phase circulating pump motor on the hot-water system. The motor was fed through a coil-operated push-button triple-pole starter and isolating switch. The conduit containing three v.i.p. cables ran from the isolator up the wall and along the ceiling to a through box. The conduit then continued through a wall to a t.p. and n. fuse board mounted on the other side, but the three cables were brought out of the front of the through box and were slung down without protection to a triple-pole switch fuse fixed to the wall.

The obvious action called for here was to take the loose v.i.p. cables out of the switch fuse and run them in the existing conduit direct to the t.p. and n. board where there were one or two spare ways.

This was done and the bridges were fused up but the motor refused to start. The starter operating coil also showed no signs of life.

A test with a normal test lamp (15 W pigmy) showed that each of the three input terminals of the starter was alive, the lamp lighting up at full brilliance between each terminal and earth. No alterations whatever had been made to the starter nor to the three leads between the starter and its isolator.

The possibility of a fault developing in the starter coincidentally (it *might* have received a knock during wiring operations) was investigated without result. When the starter contacts were held "in" manually the motor remained dead and did not even growl.

The motor was a normal fractional horse-power squirrel cage delta connected type and the test-lamp showed each of its three terminals alive to earth when the starter contacts were held in.

At this stage the electrician was getting worried but further investigation showed that the solution was in the "Of course, why didn't I think of that" category.

The board into which the new wire had been connected was a standard three phase and neutral board which had been fed with single phase only. The three banks of fuses had been coupled together to give a larger number of single phase ways.—*H. Glaister.*

### *Starter Liquid too Strong*

I WAS recently called to investigate the cause of starting trouble with a 50 h.p. 3 phase slip-ring motor. I was informed that when the stator switch was closed the overloads quickly operated, due to the rush of current which was much higher than normal. On inspection all the equipment appeared to be in good order; the switchgear, cabling and motor windings were free from earth faults, and so far as could be seen there was no other type of fault in the motor windings. As the motor was in a cement-making plant it was not easy to make a definite decision with regard to the motor wings based on a visual inspection, as cement dust had accumulated round the end windings. It was therefore decided to dismantle the motor, to thoroughly clean the windings so that a closer inspection could be made.

Before the work of dismantling the motor began, however, I made one or two enquiries as to what work, if any, had been recently carried out in the way of maintenance. I then learned that the rotor starter, which was of the liquid resistance type, had been overhauled, and fresh electrolyte put into it. On enquiring as to the strength of the new mixture, it was clear that this was too strong, resulting in too low a resistance in the rotor circuit with the starter electrodes in the full-out starting position; and the cause of the excessive current at starting.

Addition of water, after extraction of some of the electrolyte from the rotor starter, verified that this was in fact the cause of the trouble, for after one or two adjustments of the strength of the electrolyte, the motor started smoothly with normal starting current, and dismantling of the motor was avoided.—*A. D. C.*

*Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.*

# East African Hydro Power

## *Pangani extensions bring capacity to 12·5 MWs*

ADDITIONAL generating plant has recently been commissioned at Pangani Falls in Tanganyika, bringing the total capacity of the power station to 12,500 kW and a further 5,000 kW alternator is now on order. This considerably extends the original 1930 scheme.

The River Pangani rises on Mount Kilimanjaro, a mountain 19,320 ft. high, whence it descends to a plateau some 1,000 ft. above sea level.

*Map showing the Pangani River and the location of the power station*

The main falls, with a total drop of 400 ft., occur about 45 miles inland from Tanga, and the power station is situated below the falls in a part of the country which is difficult of access. The Tanga-Moshi railway passes within about 10 miles of the site, and from the railway a rough jungle road leads to one bank of the Pangani River.

A twin pipe line, 1,240 ft. long, conveys the water from the head of the falls to the power station below, and gives a head of 313 ft. For the first 418 ft. the pipes are 6½ ft. in diameter, after which they are reduced to 6 ft., the object of this grading being to reduce hydraulic friction in the upper section.

The intake dam is 290 ft. long and is constructed of concrete. The intake to the pipe line comprises a mass concrete structure in which are set six scour sluice gates to remove any debris which may accumulate. In the initial stage, only one pipe line was installed, but provision was made for the second, completed in 1949.

### *Power House*

The plant at present installed in the power house consists of four 6,600 V 3-phase, 50 cycle, G.E.C. alternators, three of which are rated at 2,500 kW and one at 5,000 kW, each provided with a main exciter and a pilot exciter. These machines are driven at 750 r.p.m. by Francis horizontal shaft turbines built by Boving and Co., Ltd., the smaller units being of the single runner type rated at 3,600 h.p., while the larger is a double runner machine rated at 7,200 h.p.

In view of the high speed of the generating sets, a special design of alternator was adopted in which each of the eight poles is dovetailed into the rotor forging and forced into position under hydraulic pressure.

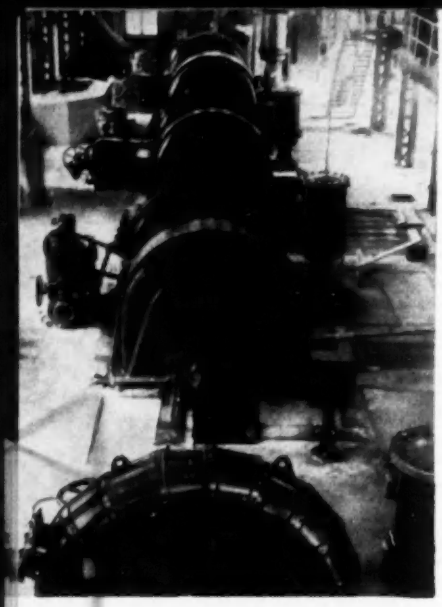
Also owing to the weight limitation, the stator of the 5,000 kW machine was manufactured in two halves, and after passing the works test, 20 coils were removed adjacent to each joint to enable the stator to be dispatched as two loads. The coils were re-fitted on site.

On each of the 2,500 kW machines, the two pedestal bearings are water-cooled, the turbine runner being mounted on an overhung portion of the alternator shaft.

The rotor of the 5,000 kW alternator runs in its own water-cooled pedestal bearings and is solidly coupled to the flywheel and to the turbine shaft which also runs in two water-cooled bearings.

The output of the four alternators is controlled by a 6,600 V cubicle type switchboard installed in a gallery. This board also controls three outgoing feeders to transformers which step up the voltage to 33 kV for transmission by an overhead system. Each circuit is equipped with an oil circuit breaker, the board being provided with duplicate busbars and two sets of busbar isolators

*A view of the power station from the river*



*The generating room of the power station*

on all circuits so that the circuit breakers may be connected to either set of busbars.

As the gear is operated by Asiatic attendants, a most comprehensive system of interlocks is provided which not only prevents access being obtained to the interior of the cubicles until all associated apparatus is dead, but also prevents incorrect switching during synchronising and changing over from one set of busbars to another.

Each alternator is controlled from an exciter desk which is equipped with a d.c. ammeter and voltmeter, an automatic voltage regulator, and hand regulators for the main and pilot exciters. A field discharge pillar is also installed.

### Distribution Scheme

A 33 kV ring main distribution system was selected as the most suitable means of supplying the area to the north and east of the falls, where the greatest concentration of sisal plantations occurs. Step-down transformers are installed at various points to supply 11 kV feeders and further ring mains. From this 11 kV system, local distribution is effected on a 400/230 V, 3-phase, 4-wire system.

It should be mentioned that the denseness of the jungle, the absence of good roads, the resulting difficulty of transport—particularly during the heavy rains—and the unhealthy climate, all combined to make the construction of the overhead lines a matter of exceptional difficulty.

This exacting task was successfully carried out by Balfour Beatty and Co., Ltd., of 66 Queen Street, London E.C.4, who were responsible for the whole of the design of the scheme and for its construction in a locality remote from any engineering facilities.

# On Load in Four Minutes

DETAILS have recently been released in the United States of the second gas turbine unit to be brought into supply authority service there. It is a 3,500/4,000 kW machine running on an open cycle, and its special interest is that it uses Bunker C residual oil.

### Running Details

The set has been installed as a peak load unit in a 5,500 kW steam station at Farmingdale, in Maine. Running at 6,680 r.p.m., it is designed for full load operation only, as at no load it has over half the fuel consumption experienced at 100% output. Efficiency is quoted at 17% at the generator terminals, or about 8 kWh/gallon of fuel (6·6/imperial gallon).

Bunker C is a thick viscous crude oil residue, which almost solidifies on cooling, and the starting procedure has been designed to take account of this. Barring gear rotates the machine at about 2 r.p.m., and a cranking motor turns it over at 10% speed for a few minutes. This running clears the firing chambers and ducts, and when it is completed diesel oil is admitted, and the machine runs up to about 80% speed. At this point, the Bunker C fuel is introduced, and the operator takes over from the automatic starting mechanism.

During the starting period the residual oil is pumped from a 300,000 U.S. gallon heated underground tank through heaters to centrifuges and then to a 600-gallon day tank. Before feeding to the turbine it passes through another heater.

Shutdown is also preceded by diesel oil running to avoid clogging pipes, etc. With this operating procedure, the starting time is kept to a maximum of four minutes.

A 15-stage axial-flow air compressor is used with the set, receiving air at 14·7 lb/sq in., 80° F, and delivering it at 86·7 lb/sq in., 94 lb/sec. The turbine inlet temperature is 1,400° F.

### Generation

Electricity is generated at 4,160 V, 3-phase, and is stepped up to 33 kV by a 5 MVA transformer which feeds the main station busbars. Local distribution at 4,160 V is also provided. The station bus feeds through a 15 MVA transformer to a 115 kV tie line.

The first cost of the new installation is given by *Electrical World* as $125/kW.

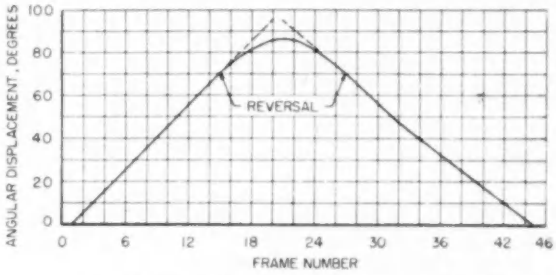
# *High-Speed Reversal of Electric Motors*

## Absorption and Regeneration of Kinetic Energy by Torsion Bar

By MICHAEL LORANT

A METHOD for reversing a small electric motor in three to four milliseconds has recently been developed by Jacob Rabinow at the U.S. National Bureau of Standards. Designed specifically to meet the need for high-speed reversal of magnetic tapes in the memories of electronic digital computing machines, the technique may prove useful in many other applications.

While it is relatively easy to stop a motor quickly by the use of brakes, rapid starts in either the same or the reverse direction are limited by the low torques which can be obtained by electromagnetic means alone. In the Bureau's rapid-reversal motor, the kinetic energy of the rotor, instead of being dissipated as heat in a brake during deceleration, is converted into potential energy in a spring, which is then used to accelerate the rotor rapidly in the opposite direction.



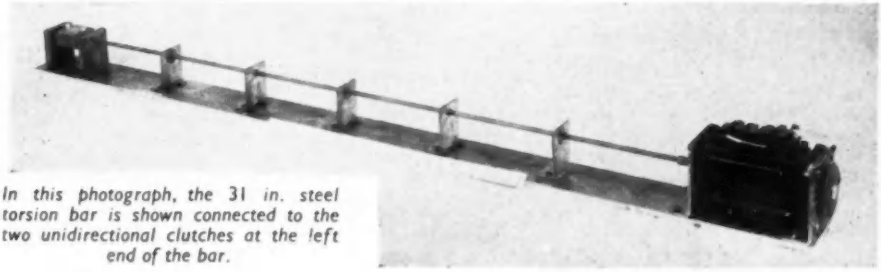

*This graph of the angular displacement in terms of numbers high speed ciné frames, shows a simple check on the reversal speed of the motor (ciné speed 4,000 frames per second)*

### *General Arrangement*

A small low-inertia two-phase motor operating at 3,200 r.p.m. is used. The reversal spring consists of a steel torsion bar approximately 31 inches long and $\frac{3}{16}$ inch in diameter. Only one phase of the motor is connected to the a.c. power supply; thus the motor will rotate in the starting direction, either clockwise or counter-clockwise. The motor shaft is rigidly connected to one end of the torsion bar, which is equipped at the other end with two positive unidirectional clutches. One clutch prevents clockwise, and the other counterclockwise, rotation. If the motor is rotating in a clockwise direction and the proper clutch is engaged, the adjacent end of the torsion bar is thereby stopped; this brings the rotor to a stop in approximately 20 degrees. The potential energy stored in the torsion bar is then returned to the rotor in the form of a counter-clockwise impulse. The motor attains virtually full speed in the new direction within about two milliseconds.

### *Time Checking*

Two methods were used in the Bureau's investigation to check the reversing time of the motor. For the simpler test, a black disc provided with a white index-line was mounted on one end of the motor shaft and photographed



*In this photograph, the 31 in. steel torsion bar is shown connected to the two unidirectional clutches at the left end of the bar.*

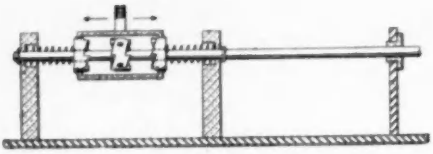


*Diagram showing operational details of the two-positive unidirectional clutches*

against a circular scale, using a high-speed camera at approximately 4,000 frames/sec.

A second means of measuring reversal speed, suggested by Frank Shepard of the Shepard Laboratories, involves locking the far end of the shaft and applying direct current to one winding of the motor, while alternating current is supplied to the other winding. Oscillations are thus induced in the rotor-torsion bar. Varying the frequency of the current makes it possible to determine the frequency of torsional resonance. The time required for the rotor to reverse can be easily computed since it is one-half of the period of a torsional oscillation at resonance. The resonance in the system tested occurred at approximately 125 cycles per sec., indicating (in a period of 8 milliseconds) a reversal time of 4 milliseconds.

In the experimental model of the rapid-reversal mechanism built at the Bureau, the clutches are operated manually, but it is expected that in normal use the clutch mechanism will be operated by suitable electromagnetic controls. Although the studies thus far have used a small motor of about 1/75 h.p., it is anticipated that motors of all sizes could be reversed rapidly by this technique, the speed of reversal being limited only by the mechanical strength of the various parts. Moreover, by use of suitable circuitry, rapid reversal of motors can be obtained without producing large current surges in the supply.

It would be entirely feasible to utilise other types of energy-storing devices, such as coil springs or pneumatic cylinders, instead of the torsion shaft. It would also be possible to use a stationary energy-storing system and to locate the clutches between it and the motor shaft.

# Lamp History at the I.E.S.

"THE Development of the Tungsten Filament Lamp," by Dr. B. P. Dudding, M.B.E., Ph.D., F.Inst.P., delivered to the Illuminating Engineering Society on Tuesday of last week, proved to be one of the most interesting lectures which we have been privileged to attend for some considerable time. As Mr. L. J. Davies, the President, pointed out, it would be difficult to find anyone better qualified to give such a lecture than Dr. Dudding, who has probably contributed more than any other man to the development of the tungsten lamp.

Main theme of the lecture, which traced the development of the tungsten lamp from the earliest days of the squirted filament to the present day, was the absolute interdependence of a number of different techniques and branches of science. Mass production of lamps depended upon the application of machinery, but machine methods could not successfully replace handwork for many processes until a high degree of uniformity had been established in the components with which the machine was dealing, since the machine, unlike the hand operator, could not make allowances for deviation from standard dimensions or composition of the materials supplied to it. Thus the successful mechanisation of many processes depended, not upon the machine or the lamp works engineer, but upon the glass technologist. When glass tube could be supplied in uniform quality, dimensions and concentricity, for example, machine fabrication of "pinch" parts was feasible without excessive loss by cracking.

In a similar manner, the metallurgist, by research into crystal growth, had made it possible to produce filaments which not only gave a reasonable life, but were comparatively immune from sagging and other troubles.

The achievements of the last thirty or forty years could, in fact, be briefly summarised as a continual rise in efficiency, and a continual progress towards trouble-free production. At one time, said Dr. Dudding, it was considered necessary to make 180 lamps to ensure 100 being marketed. Now, he considered that a works manager would have a fit if the rate per 100 lamps marketed rose from 105 to 106. The lamp industry had, in fact, been the first to use statistics as a production tool, and the concept of quality control rather than acceptance tests had been developed within that industry.

For his lecture, Dr. Dudding had not only a comprehensive collection of slides showing lamp production from hand processes of Edwardian days, but a number of demonstrations of old-time hand processes carried out by a modern glass-blower. He had hoped to stage a demonstration of old-time hand winding of squirrel-cage filaments, but illness had prevented the lady in question—one of the fastest hand-winders ever known—from appearing.

# overseas news

### New Danish Station

Since last year, the question of establishing a new power station at Salling, North West Jutland, has been under consideration by a special committee. The decision has now been taken to erect the station in the immediate future, we learn. Its cost is estimated at 43,000,000 Danish crowns, and the plant is intended to be able to meet the power requirements of a large area in Jutland where industry is being increased.

### Power in N.S.W.

The plan of the Sydney County Council to erect a new power station at Lugarno, George's River, is to be deferred for at least six years, according to a proposal of the State Electricity Commission of New South Wales. This was revealed a few days ago in a report to the County Council by the chairman, Mr. Henson, on a deputation to the Minister for Local Government, Mr. Cahill. The latter had said that the Lugarno power station scheme would be deferred till 1956-57. It would not be shelved, but the George's River station would not necessarily be at Lugarno. He said the Electricity Commission had decided to establish a new power station at Wallerawang, to put six turbo-alternators in at Wangi and extend the Tallawarra and Balmain stations. Mr. Conde, Electricity Commissioner, also disclosed that he had conferred with representatives of the American General Electric, with a view to obtaining emergency generating equipment from the U.S. The plant was urgently required for next winter, and if suitable plant was available and could be delivered in time to meet the requirements, he would make every effort to obtain dollars.

### Victoria's Report

A loss of £349,368 in the operations of the State Electricity Commission of Victoria during the 12 months to June 30 last, is disclosed in the annual report tabled in the State Parliament recently. The deficit, which compares with £73,699 for 1948-49, reduced the commission's accumulated surplus from £401,032 to £151,664. Profit on the sale of electricity dropped from £679,664 to £161,453, while brown coal sales profit fell by £6,588 to £25,625 in the year. The loss on briquetting rose by £8,000 to £18,546, and on provincial tramways by £17,000 to £125,989. The report says that revenue has increased in most cases in the last year because of tariff rises, expansion of services, and greater demand. An exception was public lighting, which had been affected by power cuts.

### Plant for Moose Jaw

As part of the modernisation of the Moose Jaw power station of the National Light and Power Co., Ltd., Saskatchewan, a new boiler was recently officially put into operation. The other part of the plan is the installation of a 15,000 kW turbo-generator complete with condenser, which is to be supplied by C. A. Parsons and Co. Ltd. early next year. There is already a 10,000 kW Parsons set installed in addition to a 5,000 kW and a 6,000 kW set. A 3,500 kW generator now in the station is to be removed, we understand.

### Rural Electrification

Planning to erect some 4,200 miles of rural line and connect over 35,000 new rural consumers next year, the electrification programme of the Hydro-Electric Power Commission of Ontario is aimed to overtake the backlog of applications for service, the chairman of the Commission, Mr. Saunders, has announced. When the programme reaches full-scale operation, about 125 construction gangs will be on the working in every section of the province. During 1950, 3,300 miles of rural lines and 34,000 consumers were added to the Commission's system. Since 1945, the sum of $85,000,000 has been spent on extending the rural service, increasing its consumers from 144,000 to 288,000. Average cost per kWh for farm service in Ontario is the lowest in Canada, he claimed.

### Optimism in Quebec

With water supplies good, and many large new generating units planned to go into operation this month and early next year, the supply outlook for Quebec's power consumers look bright. Principal reason for this optimism is the increased power that will soon be available from new developments. Shawinigan expects to have its first 65,000 h.p. unit at La Trenche Rapids, on the upper St. Maurice River, in operation this month, with the other five 65,500 h.p. units being added progressively in early 1951 until the whole 390,000 h.p. development is completed by early next summer. The first two 55,000 h.p. units of Quebec Hydro's Beauharnois expansion plan are planned to start operating in December, with the second pair of the same size in early spring. And on the Quinze River, Northern Quebec Power Co.'s 34,500 h.p. addition is expected to be in operation by 1951. Another project which adds confidence to the slightly longer term outlook is the 200,000 h.p. development being started at Chute du Diable, by the Aluminium Co. of Canada for operation in 1952.

### Belgian Railway Electrification

In the work of electrification of the Belgian State Railways, 1,118 million francs had been spent from the time of liberation until the beginning of this year, according to a report submitted to the Senate recently. Of this sum fr.605,000,000 have been spent on the Brussels-Charleroi line, fr.268,000,000 on the line from Linkebeek to Antwerp North, and the remaining fr. 245,000,000 on rolling stock. The completion of the second part of the programme is expected at the end of 1954. This includes the line from Ostend to Liege, with the branch lines Bruges-Knocke, Bruges-Blankenberge, Ghent-Melle, Aalst-Denderleeuw, Malines, Louvain and Voroux-Kinkempois, a total of 415 km, at a cost of fr.4,760 million. A further stage will bring the aggregate length of the electrified system to 1,500 km at a total cost of 16,500 million francs.

### Damodar Appointment

An American has been appointed chief engineer of the Damodar Valley Corporation, the Deputy Minister for Works, Mines and Power, Mr. S. N. Buragohain, disclosed in the Indian Parliament a few days ago. He said that no suitable Indian engineer was available for the post, in spite of the personal efforts of the Prime Minister. The terms of appointment included a salary of $25,000 per annum subject to Indian income-tax, free air passage to and from U.S., free furnished house, transport and medical service and two peons.

The Deputy Minister also said that so far as river valleys were concerned, no projects or plans had been abandoned, but some of the investigations had been slowed down, for example, the Dihang project in Assam and the Bargi project on the Narbudda. Only nine civil works were now in progress. Three river valley works were in progress, namely, Damodar Valley, Hirakud Dam and Kakrapar weir and the canal project in Bombay.

### Cable Production

Vulcanised rubber cable and cotton, covered cable production is to be begun soon at the Edenvale factory, just outside Johannesburg, of Aycliffe Industries Ltd. This concern was the first South African company to produce p.v.c. cable and wire. Last year the firm effected a close financial and technical agreement with Aerialite Ltd. of England, whereby the latter's South African selling organisation was merged with that of Aycliffe Industries. Up-to-date wire plant and cotton covering and rubber insulating plant has been imported from England, and technical personnel taken out to the Union.

### Power Wanted

The stage has now been reached in the development of the Vaal-Hartz irrigation settlement where cheap power has become essential for further progress. Power is required for operating canning factories, dehydration plants, spray irrigation plants, hammer mills and for domestic lighting purposes. This was stated in a memorandum by Mr. J. S. J. du Toit, who is in charge of the Vaal-Hartz agricultural research station, to the Northern Cape and Adjoining Areas Regional Development Association. Power units would cost about £100,000. It was important, therefore, that power should be obtained either from Vierfontein or Kimberley.

Mr. H. J. de Villiers, of the Electricity Supply Commission of South Africa, has told the Northern Cape Regional Development Association that the commission would not consider erecting the 200 miles of power-line from Vierfontein to Kimberley until at least 1957. To supply Vaal-Hartz from Kimberley at present would mean the erection of a power-line of more than 50 miles, and more consumers would be needed in order to get cheap electricity. Mr. de Villiers has suggested that until such time as the Kimberley power station is extended, diesel engine generators should be used.

### Station Extension Approved

At its meeting a few days ago, the Kroonstad Town Council (Orange Free State) was informed that the Administrator and Executive Committee had approved the proposed extensions to the power station, at a cost of £150,000.

### Review of Supply

The Local Government Commission, in its annual report tabled in the New Zealand House of Representatives a few days ago, expressed the opinion that the Christchurch City Council had a responsibility in relation to rural areas, and added that there appeared to be little doubt that the only solution of the problem of electricity supply between the Rakaia and Waimakariri Rivers was administration of the whole area by one authority. In view of the commission's lack of jurisdiction over trading undertakings of local government authorities, it did not express any opinion at the present stage as to whether the authority to control the area should be a power board or the Christchurch City Council. The report added that the question was referred to at this stage without attempting a solution in order to bring to public notice a problem which would have to be solved in the very near future. The examination of the electricity supply position in the Dominion which the commission had been able to make so far indicated that there was a strong case for the undertaking of a thorough review of electric supply districts throughout New Zealand. A wide variation in charges due, among other things, to the character of load and distribution to consumers, suggested that possibly by a regrouping of districts so as to provide, in each authority's area, a balanced load comprising both urban and rural, the charges throughout New Zealand could be made more uniform, the commission's report concluded.

# *PERSONALITIES*

## IN THE INDUSTRY

The end of this month will see the retirement of **Mr. A. G. Ramsey,** C.B.E., B.SC.(Eng.), M.INST.C.E., M.I.E.E., M.I.MECH.E., from the position of chief mechanical and electrical engineer to the Ministry of Works, which he has held since 1941. He began what was destined to be a distinguished career with the Office of Works in 1914, when he was appointed district engineer for Scotland, a post he held till 1919 when he transferred to headquarters as assistant engineer. From 1920 to 1924 he was acting deputy chief engineer, and later, for twelve years, was engineer in charge of special works, being promoted to deputy chief engineer at the M.o.W. in 1936. He is the immediate past president of the Association of Supervising Electrical Engineers, having been president for two years, and has served on numerous Government Departments, B.S.I. and other committees. In 1943-44 he was chairman of the Installation Section of the I.E.E.

*Mr. A. G. Ramsey*

**Mr. P. C. Sharp** and **Mr. D. S. A. E. Jessop,** directors of the Brush Electrical Engineering Co. Ltd., have now joined the board of Brush Coachwork Ltd.

We understand that **Mr. A. Willington** has now left Geo. Salter and Co. Ltd. to take up a new appointment. The company has appointed **Mr. R. L. Eccleston** as their new publicity manager.

Enfield Cables Ltd. inform us that **Mr. R. C. Milner,** A.R.I.C., and **Mr. C. T. W. Sutton,** M.SC.(ENG).LONDON, M.I.E.E., A.M.INST.C.E., A.M.I.MECH.E., are now associate directors of the company. Mr. Milner was educated at Derby College and Nottingham University. He was a member of the Research Department of the Macintosh Cable Co., Ltd., Derby, for 12 years, and joined Enfield as chief chemist in 1937. Mr. Sutton was educated at West Ham Municipal College and London University. After a short period in the Admiralty and municipal service, he joined Enfield Cables in 1926, as an engineering assistant in the Test and Research Department. He has since specialised in the development of high voltage transmission by underground cables, and in the Enfield compression cable system.

**Mr. H. E. Humphries,** M.B.E., manager of the Telecommunications Department of Siemens Brothers and Co., Ltd., has been appointed a director of the company.

Nettle Accessories Ltd. have appointed **Mr. H. S. Jenkins** as their representative in South-West England and South Wales.

Three new appointments have been made in the Engineering Division of the British Broadcasting Corporation. **Mr. F. C. McLean,** M.B.E., B.SC., M.I.E.E., S.M.I.R.E., becomes head of a newly formed group known as the Engineering Projects Group, composed of the Planning and Installation Department and the Designs Department. Secondly, **Mr. E. L. E. Pawley,** M.SC., M.I.E.E., succeeds Mr. McLean as head of the Engineering Services Group. And thirdly, **Mr. A. N. Thomas,** A.M.I.E.E., succeeds Mr. T. C. Macnamara, A.M.I.E.E., who has resigned from the B.B.C., as head of the Planning and Installation Department. Mr. McLean joined the B.B.C. in 1936, after 11 years with Standard Telephones and Cables Ltd. He was largely responsible for many of the transmitting stations built during the war, and in particular for the Skelton short-wave broadcasting station, which is the most powerful in the world. In 1949 he became head of the Engineering Services Group. Mr. Pawley joined the B.B.C. in 1931 from the International Standard Electric Corporation. After being in the Lines Department and the Overseas and Engineering Information Department, he was appointed head of Engineering Secretariat and, in 1949, assistant head of the Engineering Services Group. Mr. Thomas went to the B.B.C. in 1926 from the Marconi Co. He served in the Research Department, and in 1938 became assistant to the superintendent engineer transmitters. In 1947 he was appointed assistant head of the Planning and Installation Department.

The City and Guilds of London Institute has announced that **Sir George Aylwen,** Bt., has been nominated honorary treasurer, and **Prof. R. S. Hutton,** M.A., D.SC., **Dr. Walter T. Prideaux,** and **Sir Henry A. Steward,** T.D., as vice-presidents.

Manager of the Installation Accessories Department of the Sun Electrical Co., Ltd., since 1945, **Mr. A. G. Owen** has now been appointed a special director, responsible for the installation accessories' side of the company's business. Mr. Owen, who is well known in that branch of the industry, has been with the company since 1906. For many years he was assistant manager of the Installation Accessories Department.

**WILL.—Mr. Lawrence Levy,** late chairman of George Cohen, Sons and Co., Ltd., and chairman and managing director of New London Electron Works, left £310,707 16s. 4d. (£307,374 9s. 8d. net value).

C

# Power in Ontario

## *Ontario H.-E.P.C.'s Forty-Second Report*

THE year ending October 31, 1949, has seen great achievements in Ontario, according to the Hydro-Electric Power Commission's annual report which has just come to hand. The previous report (reviewed in the ELECTRICAL TIMES for March 16, 1950, page 414) dealt with a year of many difficulties; not the least of which was an abnormally low rainfall, which caused a reduction in total output (generated and purchased) of more than 100 million units and extensive restrictions in the use of power.

This year, the picture is very different, 63 MW of emergency steam and diesel units have been brought into service, arrangements were made for a further 82 MW from the Niagara Mohawk Corporation, and a further 17 MW from customer-owned steam and diesel standby plants. An all-time peak of construction activity, with a capital expenditure of $142 M also occurred during the year, which was also notable for the number of rural consumers added, the commencement of the frequency changeover in the Southern Ontario system and the commencement of tie lines between sections hitherto operating separately.

During the year the total generation capacity of the three systems was 1,495·2 MW, and the capacity of stations under contract to the commission was 734·7 MW, so that total available capacity was 2,229·9 MW or an increase of 80·83 MW. The total energy generated was 9,450,076,659 kWh which, combined with 4,582,873,331 kWh purchased totalled 14,032,949,990 kWh, an increase of about 3·5%.

The peak loads carried by the three systems which comprise the Commission's holdings were:

| | Oct. | Dec. |
|---|---|---|
| Southern Ontario | 1,743·97 MW | 1,806·85 MW |
| Thunder Bay | 171·38 MW | 174·88 MW |
| Northern Ontario | 234·88 MW | 221·71 MW |

Load trends on the various systems are not identical. On the Southern Ontario system, where on most working days some restrictions were necessary, it is difficult to determine the potential load growth. Demands of heavy industries, chiefly in the Niagara district, had receded by about 60-70 MW which appeared to have been offset by municipal and rural growth. In the Thunder Bay system the peak load shows an increase of over 30%, which was due to the addition of the Kaministiquia Power Co. and a heavy pulp mill load. Northern Ontario showed an increase of 5·5%.

### *New Construction*

The period was remarkable for new construction in progress. During December, there were over 442 separate projects varying from small switching structures and lines to Des Joachims power station itself. Power developments alone accounted for an expenditure of $72,530,000, transformer stations for $19,327,000; transmission lines for $22,890,000, and rural areas for $21,580,000.

Generating plant authorised and under construction includes Des Joachims (358 MW), Chenaux (120 MW), La Cave (144 MW), all on the Ottawa River; Pine Portage (60 MW), Tunnel (42 MW), and two steam stations at Clark Keith (120 MW) and Richard L. Hearn (200 MW) in addition to 63 MW of emergency steam and diesel capacity.

System planning involved a considerable amount of work in connection with the 25-60 cycle change-over in the Southern Ontario system which was commenced this year and will, it is estimated, take 10-12 years to complete at a cost of $190,600,000. Other system planning projects of major importance included development work on single-pole reclosing of high-voltage circuit breakers.

### *Research*

Research included further improvements on the standard Ontario Hydro water-heater and results prompted the Commission to put out a regulation requiring all water heaters to be installed with a minimum thickness of 1 in. fibreglass or its equivalent. Experimental work was also carried out on the use of heat pumps at substations for heating or cooling the control room, the low-grade heat for winter heating being obtained from the transformer cooling water.

"Linascopes" operating on radar principles were developed for locating sustained faults on long lines, and improvements have been made to an installation which automatically records location of either sustained or transient faults within 150 miles on any of four 220 kV circuits.

Other interesting items under investigation include the use of bolometers to detect overheated joints in transmission lines (ELECTRICAL TIMES, Nov. 24, 1949), improved methods of driving earth spikes, ultrasonic crack detection of concrete structures, and the use of magnesium anodes for corrosion inhibition.

### *Rural Consumers*

In 1946 a Five Year Plan was commenced to meet the accumulated demands of the post-war period. This has already exceeded the target laid down for the full five years. The number of consumers to be connected was set down as 57,904, whereas 98,735 have already been connected of which 35,206 have been connected during the last year. For lines, the target figure was 7,329 miles, but 10,490 miles have already been constructed.

During 1949 it has been necessary to revise tariffs following on an increase in operating costs of over 11%. The total revenue of the Commission was $69,369,582.

# Electricity for HOUSING ESTATES

## Some Aspects of Supply Planning considered by "C. B. Y."

THE supply of electricity to domestic consumers usually represents a fairly large proportion of the total units sold by any average size of pre-vesting date undertaking. For the year ended March 31, 1946, the average consumption per domestic consumer in one town was 1,200 units per annum. On one pre-war housing estate consisting of 307 houses (there being only three houses without electric cookers) the average annual consumption for the whole estate approached 1,500 units for each consumer.

Comparing two other housing estates in the area of supply, the average annual unit consumption is as follows:—

| | *Estate "A"* | *Estate "B"* |
|---|---|---|
| Consumers with cooker ... | 1,600 units | 2,100 units |
| Consumers without cooker ... | 400 units | 500 units |

The estimated annual consumption given by one Authority, based on a family of four for 50 weeks per year, is as follows:—

| | *Units* |
|---|---|
| Cooking ... ... ... ... ... | 1,300 |
| Washboiler ... ... ... ... | 300 |
| Refrigerator... ... ... ... ... | 300 |
| Immersion Heater ... ... ... ... | 650 |
| Lighting, radio and occasional radiator | 650 |
| Total ... | 3,200 |

### *Preliminary Work*

A demand of 1 kW per domestic consumer may be assumed and appears to be a reasonable average figure for normal conditions, although it can be easily exceeded in exceptionally cold weather. In affording supply to housing estates it is desirable that some attention should be given to providing at least one alternative supply, for many hundreds of families can be inconvenienced owing to failure of supply.

The siting of housing estates does not come within the province of the supply authority, and it is usually not until a request is made from the architect or town planning officer to afford the necessary supplies that any steps can be taken to put forward proposals.

A plan showing the proposed layout of the houses and roads is submitted, and from this it is possible to proceed with the preparation of the preliminary work.

The substation, if one is required, will have been provisionally sited by the architect, and, subject to confirmation by the Supply Authority, will serve as the starting point in the planning of the network for affording supplies to the various groups of houses.

In many cases it is preferable to complete the roads before erection of the houses is commenced, and a verge is sometimes provided between the road and each footpath.

During the early stages of site development, the various Departments affected should be consulted, and the architect can co-ordinate the work associated with the services, i.e. electricity, water, telephone and, perhaps, gas.

The pipes and cables can be laid in the verges and footpaths and, where necessary, road crossings may be allowed for.

It is now proposed to give particulars of typical housing estate substations and associated equipment.

The housing estates are situated at distances varying from two to four miles from the power station, and the estimated fault conditions at any point of supply does not exceed 100 MVA.

### *Buildings*

The buildings accommodate two transformers, high voltage (6·6 kV) and medium voltage (415 V) switch and fuse gear.

The transformers are placed indoors, and wall surrounds or fences are omitted, in spite of the difficulties experienced with children on housing estates. Windows, however, are not included in the buildings.

The choice of building materials is largely dictated by the desire to provide a pleasing appearance consistent with the houses near by.

### *Plant*

The initial installation of each substation consists of two 750 kVA indoor type transformers, but the building chambers, switchgear and cabling are all capable of ultimately taking two 1,500 kVA transformers should the need arise.

The high-voltage switchgear is of the single busbar 6·6 kV 150 MVA, oil-immersed type, and the medium voltage fusegear of the 25 MVA high-rupturing capacity type.

One transformer only is normally in circuit, but the medium-voltage fusegear can be

sectionalised so that each transformer serves one-half of the outgoing distributors.

The auxiliary equipment provided includes a 30-volt switchgear tripping battery and a private system telephone.

### Cables

The high-voltage and medium-voltage connections between the transformers and the corresponding switchgear and fusegear are of three-core and single-core paper-insulated lead-covered cables respectively.

The incoming high-voltage feeder cables are three-core, 0·25 and 0·1 sq in., paper-insulated, lead covered, single wire armoured and taped.

The outgoing distributors, which afford supplies to six-way and four-way 300-ampere fuse pillars disposed throughout an estate, are four-core, 0·25 sq in., paper-insulated, lead covered, with serving, but unarmoured.

According to the number of houses supplied the outgoing cables from the fuse pillars vary from four-core, 0·25 and 0·15 sq in., to 0·06 sq in., paper-insulated, lead-covered, with serving, but unarmoured.

The distributor loadings are as far as possible balanced, and the service cable to each house is two-core, 0·0225, paper-insulated, lead-covered, with serving, but unarmoured.

In order to reduce costs, two houses are supplied from one service, one being looped on the incoming side of the service cable. A two-pair telephone cable is laid with the high-voltage feeder to each substation. The cables are laid direct in the ground and are protected by interlocking tiles, except at road crossings, where they are pulled into self-locking earthenware pipes.

### Street Lighting

After careful consideration it was decided that sodium type lighting should be used.

The mounting height of the lanterns is 15 ft, with an average spacing between lighting points of 120 ft. The aver age lantern output throughout the life of the lamps, per 100 ft linear of road with 60-watt sodium lamps, is 2,210 lumens.

The standards are of reinforced concrete, and their bracket arms to not project into the roadway.

The lighting and extinguishing of the lamps is effected by means of the "Rythmatic" remote system of control operated from a central point. For this purpose, each standard has a cut-out and relay installed in the box, and each relay is fitted with a switch for emergency manual control.

## NEW LITERATURE

### Recent Advances in Radio Receivers

*by L. A. Moxon*

IN radio receivers of all types the ultimate sensitivity is determined by the signal to noise ratio, where the noise is the interference generated within the receiver itself. Due to war-time requirements, much work was carried out to reduce this noise to the lowest possible level, and in this volume the author analyses and explains the techniques developed to this end. Many of these techniques are readily applicable to commercial designs and are therefore of wide interest.

In addition, the author deals with improvements in circuit design and gives some information on short wave, ultra short wave, and pulse reception. As a book written to bring the pre-war designer up to date with post-war development, this can hardly be bettered. Published by Cambridge University Press, 183 pp., 8¼ in. by 5½ in. Price 18s.

### Progress in P.I. Power Cable Developments

*by C. C. Barnes, A.M.I.E.E., A.I.I.A.*

RESEARCH into power cable design has been progressing steadily for the last thirty or so years, and so Mr. Barnes has a wide field to cover. Within the bounds of a thin, paper-cover pamphlet, he succeeds extraordinarily well, and this booklet is first-rate value for the money to students and engineers requiring a general survey of power cable design. Nearly half the space is taken up by an account of modern super-voltage cables, but there are further interesting sections on manufacturing techniques, lead versus aluminium sheeting and h.v. d.c. transmission. Published by the Association of Engineering and Shipbuilding Draughtsmen, 96 St. George's Square, London S.W.1. 45 pp., 8½ in. by 5½ in. Price 2s.

### Electrical Measurements Part I.

*by D. Karo, A.M.I.E.E.*

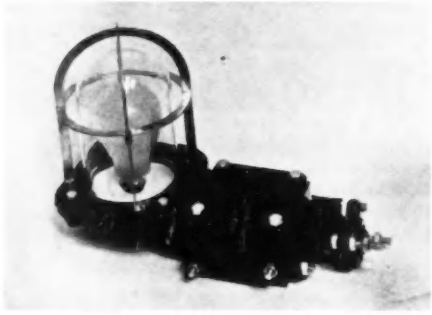
A SUB-TITLE reveals the particular attitude in this volume towards measurements problems—the calculation of the errors involved. The first two chapters are, indeed, devoted to the subject of errors in measurement generally, their classification and their calculation. The rest of the book is devoted to resistance measurements of various kinds, and to the instruments involved, their calibration and use. The range to be covered by the completed work is that of the final B.Sc. examination in electrical measurements, and the theory of the various methods is therefore treated at some length. A valuable addition to the theory that arises from the concentration on the possible error of each method, is a critical examination of the laboratory working technique to be adopted in carrying out the various measurements. Published by Macdonald and Co. (Publishers) Ltd. 191 pp., 8½ in. by 5½ in. Price 18s.

# *The* BUYER'S *Column*

## New Mine Lighting By Simplex

IT is not always necessary that the lighting equipment in collieries and other mines be of the certificated flameproof pattern. Lighting for such installation must be robust in design however, must be efficient and reliable in operation and sealed against the ingress of damp.

As a result of long periods spent in research into these matters, SIMPLEX ELECTRIC CO. LTD., Oldbury, Birmingham, have now marketed a new



*Simplex's neat mine lighting unit*

non-flameproof underground lighting system which will stand up to much hard work yet requires the minimum of maintenance and dispenses with the unnecessary use of relatively expensive flameproof gear.

The complete system includes the lamp unit, a cast iron body with porcelain lampholder (e.s. if required) connected by heat-resisting cables to split male plugs, a connection box which houses a two-pole, four-way interior and has either three or four permanent outlet ports, a cable sealing unit (of two types, one in which the cable tail enters direct into floating junction box and the other in which it is connected to a plug type separator block), a fuse box, a d.p. microgap switch in box, blanking plates to cover unused ways and an adaptor for connecting two boxes. It is available in two finishes: the standard, black enamelled cast iron with anodised aluminium reflector, or the rustproofed (Zir) finish.

## Price Increases

IT is perhaps an unpleasant sign of the times that the subject of price increases tends to become a weekly feature in these columns, but nevertheless, buyers generally realise the necessity for these changes and, we hope, are glad to be informed promptly about them.

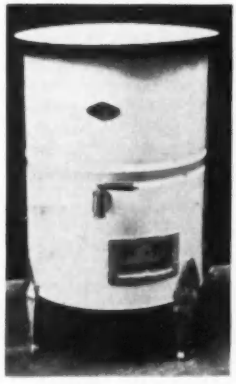
This week we have been advised by the BESTFRIEND ELECTRICAL CO. LTD. of Banstead, Surrey, that the prices of their hairdryers have been increased as from December 1.

Current prices are now as follows: Model "A", in mahogany, £2 19s. 6d. (p. tax 14s. 11d.); in walnut, £3 2s. 6d. (p. tax 15s. 8d.); in ivory, £3 7s. 6d. (p. tax 16s. 11d.). Prices for Model "B", in finishes as above are, respectively, £3 2s. 6d. (p. tax 15s. 8d.), £3 5s. (p. tax 16s. 3d.) and £3 10s. (p. tax 17s. 6d.)

The price of the "Permaster" chrome-plated hairdryer is £3 19s. 6d., plus purchase tax of 19s. 11d.

## S.W.S. Introduce New Washboilers

EXPECTED to be on the market early in January, three new model washboilers being produced by SOUTH WALES SWITCHGEAR LTD., Blackwood, Monmouthshire, incorporate many important new features. Principal amongst these is in the construction where the connection is made between the inner container, outer container and the top casting which are bolted together independently. The result of this achievement means that from the production point of view assembly is far more simple and the sealing is absolutely positive. Tests for watertightness can be carried out at this stage of construction. From the servicing viewpoint the interior of the boiler can be taken to pieces allowing the inner container to be completely changed and also the re-sealing carried out on the site by semi-skilled operators.



*Model 512*

An additional feature, quite important from the housewife's angle, is the provision of a spring clip at the back for attaching cable when the unit is not in use.

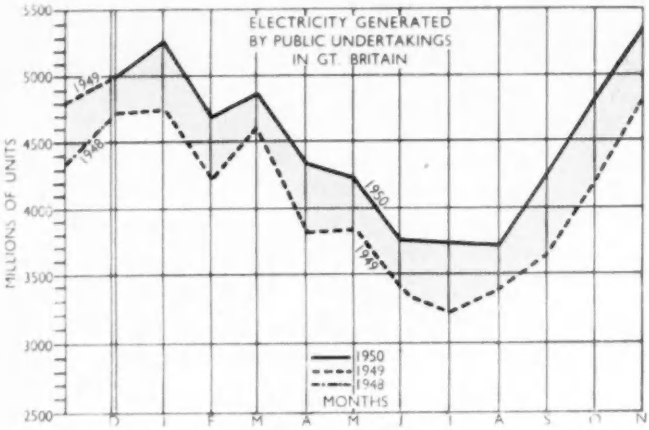
The three models are Model 510, galvanised round washboiler which sells at £7 19s.; Model 511 stove enamelled round washboiler at £9 5s.; whilst Model 512 at £10 4s. is similar but is complete with a vitreous enamel top cover. An a.c. cutout will be supplied at £1 5s. extra.

### UNITS GENERATED

5,370 million units was the total generated during November, 1950, in stations under the control of the B.E.A., the North of Scotland H.E. Board and the Lochaber Power Co. The corresponding figure last year was 4,811 million, so there has been an increase of 11·6%.

Of the total, 5,206 million units were generated in steam stations, and 140 million in hydro-electric.

Energy sent out during the month was 5,082 million units, 94·6% of that generated. This gives the total for 1950 so far as 14,775 million units, an increase of 11·8% on the same period last year.




# POWER SUPPLY IN NOVEMBER

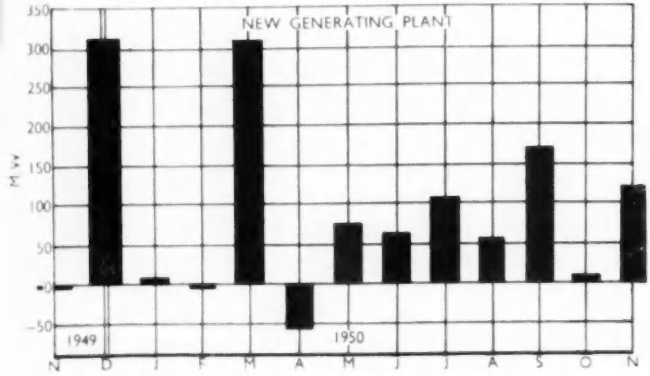
ALTHOUGH only one generating set was commissioned by the B.E.A. during November, the month is notable for the number of stations in which major outstanding extensions were completed. The new set went in at an effectively new station, Agecroft (at Salford, in the North-Western Division). It is a 52·5 MW Metropolitan-Vickers machine, taking steam from 315 klb/hr International Combustion boilers, one of which was brought into use during the month. Present programming arrangements allow for one more set and three further boilers by the end of 1954.

In the South-Eastern Division, the building of Kingston "B" was completed by the installation of the sixth 260 klb/hr Stirling boiler. Extensions at Leicester (E. Midlands) were also completed with the commissioning of a 175 klb/hr International Combustion unit, while at Hartshead (Stalybridge—N.W. Division), outstanding work was rounded off by a 150 klb/hr B. and W. boiler. Finally, in this list of jobs completed comes Dunston "B" (North-Eastern Division) with a 400 klb/hr B. and W. boiler.

### *Cold Weather*

The effect of the November cold weather is seen in the sharp rise in units generated during the month, an increase of 11·4% on October's figures, and exceeding the highest monthly total of last winter (January, 5,040 million units) by 6·6%. Coal consumption was 3,100,000 tons. The maximum demand figure for the month is not yet available.

Some saving in fuel resulted from the increased hydro-electric generation which, although below the October figure, was still some 15·7 per cent. greater than for November, 1949.




### GENERATING PLANT

At the end of November, 1950, the installed generating capacity of the B.E.A. was 14,268 MW, showing an increase of 55 MW during the month. In the same period the North of Scotland total increased 65 MW to bring the total up to 507 MW. The figure for overall increase in the last 12 months becomes 1,169 MW, or 8·6%.

The installed capacity used for the purpose of this graph should be distinguished from the output capacity. The installed capacity is the total m.c.r. of all the generating sets which are connected on both steam and electric sides and are suitable for service.

# THE WEEK

## INDUSTRY *in news* COMMERCE

### *U.K. Copper Supplies Restricted*

THE Ministry of Supply announce that from January 1, 1951, until further notice, supplies of imported virgin copper to consumers will be restricted to a total each month equal to their average monthly consumption in the first half of 1950.

Consumers of imported electrolytic copper in special shapes and to particular specification, for instance vertically cast wire bars or 1,000 lb. vertically cast cakes, will be restricted to a monthly quota of two-thirds of their average monthly consumption of these shapes in the first half of 1950. The short delivery of one-third of special shapes may be made up, if the consumer so desires, by deliveries of standard shapes subject to the overall limitation on supplies.

No further delivery contracts will be made until quotas have been notified and orders for future deliveries will be accepted by the Ministry only for amounts not exceeding two-thirds of the monthly quota.

### *Steels for Gas Turbines*

ORIGINALLY arranged for the autumn of this year, a symposium on high temperature steels and alloys for gas turbines, organised by the Iron and Steel Institute, will now be held on Wednesday and Thursday, February 21 and 22, at the Institution of Civil Engineers. Thirty-six papers will be presented and discussed during the meeting, and for this purpose they are divided into an introductory section and the following groups—user aspects, supplier aspects, performance aspects (scaling and fatigue), special casting techniques, welding and machinability aspects, special blade materials, and research and future needs.

Further details, and application forms for admission tickets and advanced copies of papers, can be obtained from the Secretary of the Institute, at 4 Grosvenor Gardens, S.W.1.

### *E.C.A. Conference at Worthing?*

ALTHOUGH next year's meeting place has not yet been announced, a possible venue for the 1952 annual conference of the Electrical Contractors Association is Worthing. Remarking that it was a pity next year's conference could not be held in the resort, Mr. T. E. Dickenson, chairman of the S.E. Sectional Board of E.C.A., said he was doing his best to ensure that the conference was brought to Worthing in 1952. He was speaking at Worthing branch annual ladies' night, and found an authoritative supporter in the local M.P., who is also president of the town's Hoteliers and Guest House Association. The latter was quite definite in his assertion that accommodation could easily be found for all delegates.

Mr. Dickenson also had a word to say on the work of E.C.A. He said he knew those present were in no way responsible for the terrible electricity cuts the country was experiencing, and expressed the hope that in ten years time they would be able to go home and dress without having to cope with a cut.

### *Frozen Slipway Delays Launching*

FROZEN slipways prevented the launching of the *Captain J. M. Donaldson*, the fifth of six colliers being built by Pickersgill and Sons, of Sunderland, for the B.E.A. After the naming ceremony the ship would move only a few inches in half an hour, due to frozen tallow, and an attempt to tow her off the slipway resulted in a parted cable. The 4,500 ton (dead weight) collier was christened by Miss M. E. M. Donaldson, a sister of Capt. Donaldson, who was formerly president of I.E.E., chairman of E.D.A., and is at present a part-time member of the Eastern Electricity Board. Capt. Donaldson himself was present at the ceremony.

### *B.B.C. to Give Cut Warning?*

A NUMBER of interesting questions were put to the London Electricity Board when they met members of the Area's Consultative Council and District Committees last Thursday. Mr. H. J. Randall, chairman of L.E.B., who presided, said the meeting had been called to keep the Council informed of events, and further the policy of close relationship between the three bodies. Strangely enough, little was said on the annual report, although that was the primary purpose of the meeting, but most discussions were on aspects of electricity cuts.

Great concern was expressed on adequate warnings prior to cuts, and the chairman said he

### *The First Half-Century*

Last Monday the "Welcome Home" dinner to the Active Service Corps of the Electrical Engineers came off most successfully at the Princes Restaurant, where the Send-Off dinner was held last January. In Lord Kelvin's unavoidable absence Professor Perry took the chair, and all things went merrily. Sir William Preece proposed the health of our guests in a most happily humorous speech. *From our issue of December* 20, 1900.

had discussed the matter only the previous day when every method from air raid sirens to the B.B.C. had been mentioned. The latter system found plenty of support, but Mr. Randall pointed out that the B.B.C. had hitherto refused to co-operate. The Board was going to press the suggestion, however, and he added that if the B.B.C. could issue gale warnings he did not see why "Mrs. Dale's Diary" should not be interrupted to give a warning on power cuts. Another member of the audience suggested that purchase tax be taken off fluorescent lamps. This, he argued, would increase the sale of that type of lighting which was far more economic and saved about 20% of power consumed. The chairman replied that it was an excellent proposal, and he would forward it to the appropriate authority.

In reply to a suggestion concerning the installation of maximum demand meters, Mr. Randall said it had been proposed to the Board that half a million of these devices should be fitted. It had been found, however, that the scheme was extremely complicated to operate and the cost (£2½ million) was far more than they could afford.

Before requesting comments, criticisms and suggestions, Mr. Randall skipped briefly through the Board's annual report. He made it quite clear that the comparatively large surplus was a trifle misleading and asked his audience not to expect so large a sum next year. The rises in wages, in the cost of coal and electricity, and in new plant would not reveal themselves until the third report was published. On the question of contracting, the chairman emphasised that every precaution was being taken to ensure that there was no unfair competition with private contractors.

### *Conference Room Lighting*

Fluorescent lighting units conforming with the layout of tables have recently been installed in the main conference rooms at B.E.A.'s London headquarters in Oxford Street. The installation, which consists of a series of twin 80 W 5 ft. lamps built into rectangular plaster features, is probably one of the best examples of lighting for such purposes in the country. Although the completed fixtures appear to be a complicated design, they are in fact very simply constructed. Basically, each unit consists of three pairs of mild steel hangers supporting a "T" section frame in which are fitted louvre panels. The plaster coving, which was added after the lamps had been fitted, provides an attractive finish. Reflectors are included in the framework, and are removable so that access may be gained to control gear which is situated on trays between the hangers.

The design, by B.T.H., gives a relatively high degree of light, particularly at table level, and any possibility of direct glare is avoided by the inclusion of opaque plaster sides and "egg-crate" louvre panels which conceal the lamps.

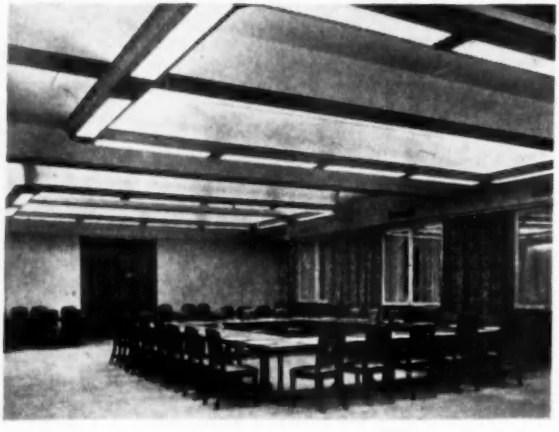
### *Utilisation Trio*

THREE short papers by Graduate members of the Institution were presented to the I.E.E. Utilisation Section for last Thursday's Junior Members Night. First came a review of calculating machines, both analogue and digital, which was presented by Mr. C. G. Hopper, B.Sc. (B.E.A.). After an historical review of progress up to the beginning of the century, he described the basic elements of machines in terms of speed and storage capacity. Mr. D. J. Pitstow, B.Sc.(Eng.) (B.T.H.), came next, with a concise description of the development of induction alternators for aircraft. After outlining the theory of their operation, the author dealt in some detail with the problems arising in application to aircraft, and with the solutions found.

The third author was another B.T.H. engineer, Mr. R. Bugler, M.A., who chose track circuits as his subject, and who dealt ably with both the a.c. and d.c. applications of the system. All three papers attracted a lively discussion, to which the authors briefly replied.

### *Lectures After Christmas*

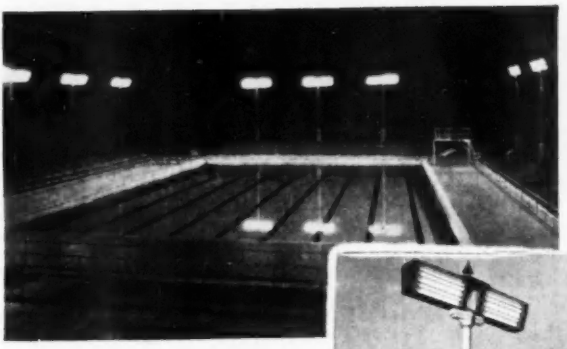
LECTURE series of interest to engineers are included in the winter and spring lists of the Sir John Cass College, which we have recently received. A laboratory course in fuel analysis will begin on January 8, and continue on Monday evenings, while the law of patents will be reviewed in eight Thursday evening lectures commencing on January 25. Further details of the courses can be obtained from the Principal of the College, which is in Jewry Street, Aldgate, E.C.3.

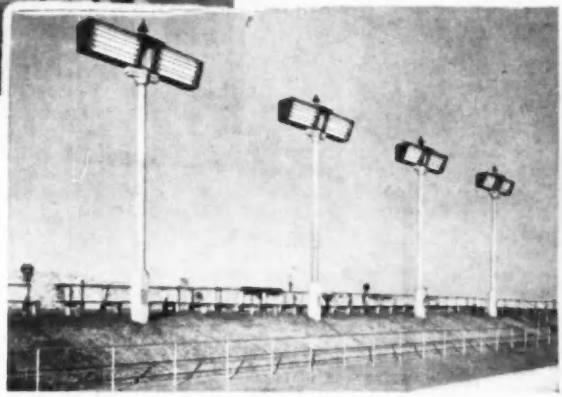


*New fluorescent lighting in B.E.A. headquarters' conference room in Oxford Street, London*

### *One Hundred and Still Going Strong*

THE year 1950 marks the one hundredth year of existence of the well-known firm of Fisher and





*Fluorescent lighting scheme installed at the open-air swimming pool at Vanderbijl Park, Johannesburg, by the G.E.C. Eleven columns have been erected round the baths. Left is a view of the pool at night, and below can be seen four of the columns erected on the grass verge of one side of the pool*

Ludlow, Ltd., and to mark the occasion the firm has published a very attractive brochure. It traces the history of the firm from 1849 when Mr. Fisher started selling tinmen's furniture at 238 Sherlock Street, to 1880, when Henry Walter Ludlow joined him in partnership, on through the Boer War when the firm produced mess tins and camp kettles as part of their first Government contract, till the World War when Hitler's Luftwaffe made a point of visiting the Coventry works. Today the Albion factory is a different place with its spacious shops, canteens, washrooms and surgery. It occupies 33 acres of modern factory buildings on a site of 103 acres at Castle Bromwich, Birmingham.

The range of goods produced has expanded enormously since the early days. Today chain conveyors, gravity conveyors, pallet trucks, mobile storage, industrial seating, shelving, car bodies, in fact all forms of press-work are produced, and, of course, the "Bendix Automatic Washer" in which company the firm has a controlling interest.

It is thus more than coincidental that 1950 should also mark the introduction of a new and even better "Bendix," the Model 'D' which was described in our issue of Nov. 30. It is both an indication of past achievements and a preview of further progress in years to come.

## *High Court Order*

IN the past three years, the I.E.E. have taken action in 33 cases of persons who have placed the initials M.I.E.E. after their names. In September, 1947, the Institution stated that they would always endeavour to prevent the misuse of the designations of I.E.E. membership. Although in each of the 33 cases matters were brought to a satisfactory conclusion without going to Court, in one recent case it was found necessary to do so, and the Institution obtained a High Court Order forbidding the use of the initials or any similar designations.

## *Swimming Pool Floodlit in S.A.*

PUBLIC authorities who may still be scratching their heads about plans for outdoor lighting schemes for the Festival of Britain, may gain inspiration from a recent installation carried out by the G.E.C. in the open-air swimming pool at Vanderbijl Park, Johannesburg. A series of 11 specially designed fittings have been mounted on columns round the bath's perimeter, each of which contains six 5 ft. 80 W daylight colour fluorescent lamps. These lamps are grouped in two sections of three in front of individual parabolic reflectors, and the central portion of each fitting houses an additional 300 W tungsten lamp which illuminates the area behind the column.

An important fact which Festival planners will be concerned about is that the floodlights do not marr the attractive surroundings of the pool during the daytime. Decorative features on the columns have been designed to blend with the grass verges on which trees are being planted and pergolas constructed to provide shaded seating. Thank you, Johannesburg, for a good example of floodlighting which will be difficult to improve.

## *Training Technical Teachers*

IMPORTANT new arrangements for the training of technical teachers were announced last week by the Ministry of Education. When the Emergency Training Scheme is wound up, colleges in London, Huddersfield and Bolton are to be continued as part of the permanent teachers' training scheme.

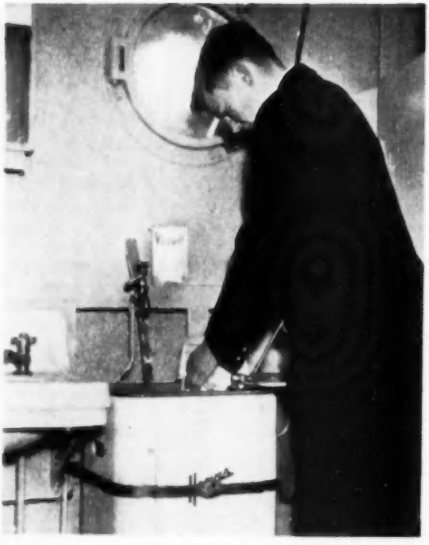
The colleges will be maintained by the appropriate local educational authority, and will provide a full-time course of one year's duration for experienced persons in industry wishing to teach in technical colleges or secondary technical schools.

Free tuition, with maintenance and dependants grants where necessary, will be provided to selected students, who should be of degree, H.N.C. or similar standard. College authorities will be responsible for the selection of students.

## *Film Strips in Engineering Training*

FOR some time now intellectual and professional attention has been focused on the importance of visual aids in education. Prominent among these aids, probably because of its convenience and portability, is the 35 mm. film strip.

To aid teachers in technical establishments, Stripslides, Ltd., Canons Park, Edgware, Middx., has produced a series of filmstrips on "Modern Engineering Practice." First issues deal with "Air Break Switchgear" and "Oil Break Switchgear." These subjects are fully illustrated by photographs and by clearly drawn diagrams. In these cases the producers acknowledge their indebtedness to English Electric and to Reyrolle's for much of the information. Film strips on overhead lines and electrical installations are in preparation. Teaching notes are not issued with these filmstrips as they are intended to be supplementary aids to the lecturer, not a means in themselves. Filmstrips are supplied with frames 24 mm. × 36 mm. unless ordered otherwise. The publishers inform us that they would be glad to consider suggestions for further subjects in the series. Distributors are Dance-Kauffman Ltd., 18 Upper Stanhope Street, Liverpool 8.



*A member of the crew of the S.S. "Beecher Island" finds that washing his oily overalls is a simple task with the Hoover washing machines now installed in the British Tanker Co., Ltd.'s ships*

## *Washday at Sea is Easy*

SAILORS scattered over the seven seas will envy their comrades aboard the oil tankers of the British Tanker Co., Ltd., despite the unpleasant conditions often associated with that type of craft. Drab off-duty hours of scrubbing dirty overalls in the fo'c'sle have ceased for men aboard these ships, for new washing machines are being installed in at least 38 of that company's vessels. Near at hand to their home port of Swansea are Hoover Ltd., who were entrusted with the first order. After early experiments Hoover found that the only modification considered necessary to standard designs was a means of securing the machines to the deck or bulkhead. The installation proved so successful, we understand, that the order has now been increased to cover most of the fleet, because it was subsequently discovered that not only the engineers but cooks and all other seamen have found the machines a great boon in dealing with their washing problems at sea.

## *Railway Signalling*

SOME £7 million, or almost one-seventh of total expenditure on maintenance, was spent on signalling, telegraphs and telephones by British Railways during 1949, said the Rt. Hon. Lord Hurcomb when he addressed members of the Institute of Railway Signal Engineers recently. Lord Hurcomb said the extension of track circuiting to cover complicated lay-outs through junctions, the introduction of electrically operated points and resort to colour light signals were comparatively recent. More recent still had been the advent of complete power signalling installations embodying intricate circuits, including automatic route setting.

Nevertheless, signalling was being brought up to date, he said, and cited additions and improvements during 1949 which cost £650,000. Work on the Liverpool Street/Shenfield line cost over £1½ million and the Bricklayers Arms to Coulsdon scheme, now in the course of construction, was estimated to cost about the same. The completed scheme would give colour light signals from London to Brighton. Only modern methods could enable more frequent services and immunity from accidents, maintained Lord Hurcomb.

## *Christmas Greetings*

FROM our friends in the electrical industry we have received many gay and attractive calendars which have carried with them good wishes for Christmas. The ELECTRICAL TIMES gratefully acknowledges every greeting and sincerely reciprocates each one. Among donors in the past week or two were the Edison Swan Co., Ltd.,

*Dr. L. G. Brazier, director of Research and Engineering with B.I.C.C., making the presentation to Mr. J. C. Clegg, winner of the Technical State Scholarship at the annual prizegiving ceremony at the company's Prescot works. Awards were presented to some 150 students including Mr. B. J. Wardley, who gained the I.E.E.'s Duddell Scholarship. Both Clegg and Wardley are now at Liverpool University*

who sent a cut-out background depicting their Mazda valves with a day-by-day calendar attached, and the D.P. Battery Co., Ltd., who gave us a glimpse of the countryside near their Derbyshire factory. We envy their fortune in being situated near such a delightful spot. C. A. Parsons, Ltd., have chosen coloured drawings of workshop scenes to enhance their 1951 calendar, and the familiar homely picture arrived from G. E. Wallis and Sons (Electrical) Ltd. Others have reached us from Tilling-Stevens Ltd., Maidstone, the Liverpool Electric Cable Co., Ltd., the London Electric Wire Co. and Smiths Ltd. (London), Scottish Cables, Ltd., and G. S. Peckham and Co., Ltd.

# NEWS IN BRIEF

The "Electrical Power Exhibition" will be opened at the Engineering Centre, 251 Sauchiehall Street, Glasgow, by Mr. J. S. Pickles, chairman of S. W. Scotland Electricity Board, on December 21. The exhibition will remain open until December 25.

Some 300 members and their guests of the Tunbridge Wells and Maidstone Branches of E.C.A. met at the Royal Star Hotel, Maidstone, recently for their fifth annual dinner and dance. Dinner and speeches were followed by dancing, which continued until the early hours of morning.

At the annual dinner of the Bristol Electric Club, Mr. H. D. Denman, chairman, said the club was particularly proud of the fact that in the past five years they had given £930 to the industry's benevolent fund. This he said represented about £1 per head per year.

# *Questions in Parliament*

### Saturday Working

Asked about his negotiations with both sides of industry and the B.E.A. for the general resumption of Saturday morning working, Mr Isaacs said any change involving Saturday morning work would have to be considered industry by industry, and suitably organised in each area. The Electricity Sub-Committee considered that an extension of load spreading on the five normal working days would, in general, be a quicker and more effective contribution towards assisting in finding a solution to the problem.

### B.E.A. Advertising Policy

The matter of the advertising arrangements of the B.E.A. was raised by Mr Mabarro, who considered the policy was completely out of harmony with the requirements of the national fuel and power situation. He complained about the "particularly offensive" campaign of the Authority over the caption "Another New Power Station." One of these advertisements referred to the new Stourport power station, and after giving a short description of the plant, stated, "More power from Stourport means more power for the nation." He asked where was there any exhortation to use electricity? He also said that the power house was constructed in 1925/26, but that the extension, the "B" station, was opened last September. The B.E.A. would not tell him the cost of any particular advertising campaign, nor could the Consultative Council help.

Turning to another aspect of the Authority's advertising arrangements, he instanced "Electrical Housekeeping," which was issued free; a copy he had included many articles only one of which had anything to do with electricity, together with advertisements for various electrical appliances. He thought it incongruous that the Authority should be persuading people to buy appliances and devoting paper to advertising arrangements which seemed to have no useful purpose. A co-ordinated advertising policy for the coal gas and electricity industries was urged.

Mr. Robens said that the question was largely a matter of opinion. Mr. Mabarro had one opinion and the B.E.A. another. He liked the posters, but agreed that others may not. It was also pretty

cheap to take up a magazine, but the B.E.A. were showing to their consumers something about electricity. They were making it readable. During the summer they concentrated on prestige advertisements, and during the winter they were switched on to the off-peak loads.

When Mr. Mabarro later stated that although he could not get the cost of the campaign from the Authority, he had obtained the information from the advertising profession, Mr. Robens said the B.E.A. would be interested to know that people with whom they had contracts revealed private information. If he were them, he would write those people off his list and they would get no more advertising. But the action of the Consultative Council in not furthering the quest for information he considered decent and reasonable.

**Generating Equipment (Export)**

The President of the Board of Trade was asked for the value since the end of the war of exports of electrical generating machinery and equipment, and the value of such equipment sent to countries beyond the Iron Curtain. Mr. Rhodes replied that equipment for power stations was not separately distinguished in the trade accounts, but the value of generating equipment for power stations produced between January, 1946, and September, 1950, for export amounted to £32 million. Less than £2½ million of that total went to countries beyond the Iron Curtain.

# *Electric Supply News*

**Faversham**

The South Eastern Electricity Board is proposing to change over the supply to consumers in Faversham from d.c. 230 V to a.c. 240 V. Formal application for consent has been made to the Minister of Fuel and Power.

**South Western**

As a further shot in the municipal housing estates controversy, the South Western Electricity Consultative Council has now passed a resolution stating that the Council adhered to the principle of freedom of choice for the tenant. It considered, however, that where a local authority for reasons of its own decided to install cookers and other domestic appliances, it must have due regard in reaching its decision as to whether such appliances shall be for gas or electricity on the economic factors involved, taking into consideration the terms based on commercial practice quoted by the Gas and Electricity Boards respectively. As the chairman of the Council stated, it was the housing authority that determined what money was to be spent on the services.

The Council also received from the Electricity Board a programme of rural development work for the nine months from July, 1950, to March, 1951. The Board would be working on schemes to give supplies in Somerset, Devon, Cornwall, Gloucestershire, and Dorset, as follows:—

Somerset: 565 farms, 2,564 other premises—total 3,129. Devon: 212, 1,710—1,922. Cornwall: 107, 611—718. Gloucestershire: 16, 76—92. Dorset: 70, 193—263. Grand totals: 970 farms and 5,154 other premises.

**Shoreham**

Although a Bill covering the £1,500,000 development plan for Shoreham Harbour has been passed by Parliament, the British Electricity Authority have not yet advised the Harbour Trustees whether they intend to proceed with the scheme, it was reported at the recent meeting of the Trustees. The reason for any delay is the doubt over incidental expenses, it is stated Ships of only 1,500 tons can use the harbour at present, and the development was proposed to allow 4,000-ton colliers to supply the Southwick "B" station, which may be ready in 1952. Cost of the development would be borne by the B.E.A.

**Sunderland**

The North Eastern Electricity Board, as an experiment, has arranged that tenants of all-electric or almost all-electric houses on a new council housing estate, may pay an agreed weekly sum, and any adjustment will be made at the end of the financial year. The experiment is to help those tenants who find difficulty in meeting a larger quarterly bill.

**Sutton Coldfield**

The B.E.A. has decided to compulsorily purchase 3·68 acres of land, partly worked as a sand-pit, adjoining Chester Road, Short Heath, for the purpose of depositing ash from the nearby generating station. Authorisation of the Minister of Fuel and Power is awaited.

**Yorkshire**

Deploring a new standardised domestic tariff to be introduced by the Yorkshire Electricity Board, the Area Consultative Council last week asked the Board to reconsider it in view of the Board's good financial position. Under the new charges, in dwelling houses of not more than three rooms, the first 26 units p.q. would be at 4d. p.u. and all extra at ¾d. p.u. In larger houses for the first three rooms 26 units p.q. and for each additional room 9 units p.q. would be charged at 4d. and all above at ¾d. Prepayment meter supplies would be as above except that 5d. p.u. will be charged instead of 4d. After discussing the tariff the Council passed a resolution greatly deploring the effect that the Board's proposed new tariff would have upon a very large number of consumers in shape of increased charges. While feeling that the Council had no option other than to accept the type of tariff proposed but in view of the Board's financial position the Council requested the Board to reconsider the matter with a view to the introduction of a tariff which would give easement to a number of consumers who would be faced with an increase of charges.

## LIGHTING SCHEMES

**Blackpool.**—The T.C. has decided to defer until 1951-52 the scheme for converting part of Preston Old Road and Cornwall Place, Marton, to electricity, at a cost of £1,800.

**Carrickfergus.**—After studying schemes for street lighting of the Victoria Housing estate, at a cost of £2,903, submitted by the Electricity Board for Northern Ireland, the town clerk was instructed to obtain an estimate for mercury vapour lighting.

**Darwen.**—Lighting of the main road in the town is to be improved, using sodium and fluorescent lamps.

**Folkestone.**—A modified decorative lighting scheme for next year has been decided upon, at a cost of £750.

**Gosforth.**—A plan has been drawn up for re-lighting of High Street and Great North Road. It involves 117 sodium lights, at a cost of £3,455.

**Hove.**—The T.C. is recommended to install improved lighting in Hove Kingsway, at a cost of £6,356.

**Southport.**—The Corporation Lighting Committee has recommended that the sum of £7,494 be borrowed for Class A lighting in Liverpool Road, Preston New Road, Sussex Road, Union Street and Hill Street. The lighting engineer is to prepare a scheme for electric lighting in Oxford Road. A scheme for the installation of sodium lighting in Lord Street West has also been approved.

**Walthamstow.**—The borough engineer is to consider schemes for improved lighting of Forest Road and Larks Hall Road.

# *Company Activities*

### Allbright and Wilson

The directors have announced that the issue of one 5s. Ordinary stock unit for each 5s. stock unit held, agreed at the recent meeting, can now be effected following approval of the High Court to the variation of the rights of the 6% Original Preference shares. Stock certificates are to be posted on January 15. The new stock will rank equally with the existing Ordinary stock for the final dividend payable for the year to December 31 next.

### Hoover Ltd.

Treasury consent has been received to the issue of a 100% scrip bonus, by the capitalising of £975,000 of reserves, and to apply that sum in paying up 3,740,000 Ordinary shares of 5s. each and 800,000 "A" Ordinary shares of 1s. each. It is proposed to allot these to holders on a one-for-one basis. Renounceable allotment letters are being sent out; an extra-ordinary meeting is called for December 28. In accordance with the company's Articles, the amount of fixed dividend divisible among the "A" Ordinary shares will not be increased.

### Rhodesian Cables

The directors propose to reduce the present issued capital of £675,000 in 2,700,000 shares of 5s. each to £202,500 in shares of 1s. 6d. each. The reduction is to be effected in part by the distribution of 1,160,000 shares of 5s. each in Scottish Cables (South Africa). An extraordinary meeting is to be held on December 22.

### Tube Investments Ltd.

The Electrical Division, which produces Creda and Simplex products, has improved its contribution to the Group's results and has gained its fair share of the available trade, both at home and overseas, declared Mr. I. A. R. Stedeford, chairman, at this meeting. There still remained, however, a number of factors beyond the industry's control which necessarily curbed the great potential demand for electrical appliances, he pointed out. Concerning overseas interests during the year, they had purchased the assets and goodwill of Southern Engineering Supplies, Ltd., of Johannesburg. This firm made switchgear similar to Simplex; and other electrical goods under the trade name of Sesco. The business is being transferred to new buildings at Springs. On aluminium, he referred to the recent Anglo-American talks on plans for an equitable distribution of raw materials for rearmament, and considered that it would be reasonable to expect that this country would receive enough metal to enable at least its more efficient fabricating plant to operate economically. He also referred to important new developments, including additional plant to produce long boiler and other high duty and special tubes such as required for power stations.

### Yarrow and Co.

Revenue for the year to June 15 was £236,370, as compared with £183,056 for the previous year. Taxation allocation takes £120,000 (*£81,000*), and the 10% dividend and bonus 5%, both tax free, absorb £22,500. Placing £100,000 to general reserve, there is £87,102 (*£127,271*) carried forward, after allowing for depreciation, etc. charges.

### Dividends Declared

*British Insulated Callenders Cables Ltd.* Interim of 2% (*same*).

*Pinchin Johnson and Associates.* Interim of 7½% (*same*), on increased capital.

*Waygood-Otis Ltd.* Interim of 30% (*20%*).

# Commercial Information

## CONTRACTS OPEN

### HOME

**Dec. 23.—Peebleshire.** Electrical work in erection of Treatment Centre at Innerleithen. Applications to John Mackie, County Clerk, County Buildings, Peebles, by the above date.

**Dec. 23. — Troon.**—Electrical work in erection of 40 houses in 16 blocks in Barassie housing scheme. Applications by above date to George T. Adam, Town Clerk, Town Clerk's Office, Troon.

**Dec. 23.—Wicklow.** Installation of electric wiring for lighting and heating at Court House, Baltinglass. K. J. Brangan, County Secretary, County Council Offices, Court House, Wicklow.

**Dec. 28.—Winchester.** Supply and erection of two diesel engines (each 100 h.p.) and a variable speed electric motor (100 h.p.) for driving 3 existing pump sets. City Engineer, Guildhall. (See Nov. 30 issue.)

**Dec. 29.—Belfast.** City Hospital invites tenders for supply of refrigerators for Gardner-Robb Auxiliary Maternity Unit. Documents from Supplies Officer of the Hospital.

**Dec. 30.—Haslemere U.D.C.** Supply and erection of electric motor of approximately 60 b.h.p. to drive multi-stage centrifugal pump, with starting and automatic gear. Engineer and Surveyor to the Council, Council Offices, Museum Hill. (See Nov. 30 issue.)

**Dec. 31.—Ipswich.** Group Hospital Committee requires supply of electric lamps for all hospitals. Applications by the above date to John Williams, secretary, at East Suffolk and Ipswich Hospital, Anglesea Rd., Ipswich.

**Jan. 1.—Chester.** Renewal of electrical installation in Town Hall. Consulting Engineers are Sloan and Lloyd Barnes, 34 Castle St., Liverpool 2. (See Dec. 7 issue.)

**Jan. 3.—Newcastle-on-Tyne.** Rewiring of 41 houses at Walker. City Architect, 18 Cloth Market, Newcastle.

**Jan. 3.—Romford.** Electrical installation in 10 shops and 6 flats on Gobions estate. Borough Engineer, Town Hall, Romford. Deposit £2 2s. (Advertised in this issue.)

**Jan. 3.—Wandsworth.** Supply of electric lamps and electrical works for periods up to April 1, 1951. R. H. Jerman, Town Clerk, Municipal Buildings, S.W.18.

**Jan. 8.—Baldock (Herts) U.D.C.** Provision and erection of street lighting units on concrete columns. Council's Engineer and Surveyor, Council Offices. Deposit £2 2s.

**Jan. 5. — Belfast.** Electricity Dept. require supplies of materials, including static transformers, 6,600 V armour-clad switchgear, overhead line materials, copper covered and rubber insulated cables, street lighting fittings and ancillary equipment, cookers and lamps. Dept.'s address is East Bridge St., Belfast. (See Dec. 7 issue.)

**Jan. 6.—Dagenham.** Electric lamps are included in a list of supplies required by the Council during the year beginning April 1, 1951. Applications should be made to Borough Engineer and Surveyor.

**Jan. 6.—Walsall.** Supply of electrical equipment for Footherley Hall residential nursery. L. J. Joseph, Children Officer, Children Dept., 29 Leicester St., Walsall.

**Jan. 8. — Billingham U.D.C.** Street lighting works as part of Roseberry Rd. development scheme. Eric G. Lediard, Chartered Civil Engineer, 4 Eldon Square, Newcastle-on-Tyne 1. Deposit £5 5s.

**Jan. 8.—Durham.** Electrical installation in proposed hostel at Winlaton. Applications by the above date to the County Architect, Court Lane, Durham.

**Jan. 8.—Hastings T.C.** Electrical installation in 116 houses at Hollington. Borough Engineer, 37 Wellington Square, Hastings. Deposit £2 2s. (See Dec. 14 issue.)

**Jan. 11.—Belfast.** Electrical installation at Whitehouse Old People's Home for City Council. City Surveyor's Dept.(Architectural Section), Room 85, City Hall, Belfast. Deposit £3 3s.

**Jan. 12.—Kidderminster.** Installation of new radio equipment for (approx.) 90 beds at Kidderminster General Hospital, Hospital Administrative Officer, Mill St., Kidderminster. (See Nov. 23 issue.)

**Jan. 18.—Huntingdon.**—Wiring for electricity of following houses: 1-10 Stow Rd., Spaldwick; 1-2 Easton Rd., Easton; 1-4 Church Lane, Brington; 1-2 Thrapston Rd., and 1-4 Grafham Rd., Ellington. Surveyor, Montagu House, Huntingdon.

**Jan. 19.—Belfast.** Supply and erection of (*a*) $CO_2$ fire fighting equipment for protection of 6,600 V switchgear and (*b*) 33 kV and low voltage cables, for harbour power station. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne 1. Deposit on each is £5 5s. (See Dec. 14 issue.)

**Jan. 20.—Grantham.** Electrical works in hostel at Kesteven Training College, Stoke Lochford Hall, nr. Grantham, for C.C. Applications to Council's Consulting Engineers, E. G. Phillips, Son and Norfolk, Arskus House, Annesley Grove, Nottingham, by Jan. 4. (Advertised in this issue.)

**Jan. 24.—Metropolitan Water Board.** Supply and delivery of a main l.t. switchboard at pumping station at Ashford Common, Middx. Board Offices at New River Head, Rosebery Ave., E.C.1. Deposit £1 1s. (See Dec. 14 issue.)

**Jan. 31.—York.** Installation of (*a*) mechanical services, and (*b*) electrical services in former military hospital at Fulford Hospital, Naburn, York, for Leeds Regional Hospital Board. Applications to Architect to Board, 29-31 Eastgate, Leeds 2, by Dec. 20. Deposit £2 2s. for each.

**Feb. 5.—Bridge of Allan.** Supply and installation of 42 street lighting columns, wiring and fixing of lanterns with sodium lamps and gear, time switches, etc., in Henderson Street (A.9). John B. Craig, Burgh Surveyor's Office. Deposit £2 2s.

**No date stated.—Durham.** Electrical installation in proposed hostels at Winlaton and Billingham. County Architect, Court Lane, Durham.

**No date stated.—Ennerdale (Cumberland) R.D.C.** Supply and erection of 32 electric street lighting points at Smithfield, Egremont, and 30 points at Cragg Rd., Cleator Moor. Surveyor, Council Chambers, Cleator Moor.

**No date stated.—Haddington.** Electrical work in alterations to houses in Hope Park. Applications to A. C. Stevenson, Town Clerk, Haddington.

**No Date stated—Kelso.** Electrical work in 12 houses on Inchmyre site and 11 at Roxburgh St. Applications to John Pennie, Town Clerk, Kelso.

**No date stated.—Leven T.C.** Electrical work in 16 houses in six blocks at Mountfleurie. Applications to A. D. Haxton and Watson, 5 Scoonie Place, Leven.

## OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

**Jan. 6.—Canada.** 63 a.c. distribution panel boards for 120/208 V, complete with all necessary component parts for Yonge Street Subway, Toronto. Toronto Transport Commission, 35 Yonge St. B.o.T. (Ref. CRE (IB) 71845/50).*

**Jan. 16.—India.** 17 motor-driven submersible pumping sets for Army H.Q., New Delhi. Directorate General of Industries and Supplies of Govt. of India, Shahjahan Rd. B.o.T. (Ref.: CRE (IB) 72227/50).*

**Jan. 16.—Sydney.** Australian Dept. of Civil Aviation require supply of fuses for radio and radar equipment. Details from Australia Hse., London.

**Jan. 19.—Johannesburg.** Municipality of Despatch (Cape Province) require following equipment: h.t. overhead lines for 11 kV system, 11 kV cable feed; main h.t. switchboard; outdoor steel (kiosk) substations; l.t. distribution system; pole mounted substations; l.t. feeder cables; 400/500 house service connections; and street lighting throughout township. Documents from Council's Consulting Engineer, Chas. H. Stanbridge, 1 Graham Buildings, Britannia St., Port Elizabeth. Deposit £5 5s.

**Jan. 31.—Wellington (N.Z.).** Post and Telegraph Dept. requires one u.h.f. signal generator, frequency range 2,500 to 5,000 mc/s; and one v.h.f. field intensity measuring set, frequency range approx. 25 to 600 mc/s. Director-General (Stores Division), G.P.O., Wellington C.1.

**Feb. 21.—Brisbane.** State Electricity Commission invite tenders for two 66 kV circuit breakers for Maryborough substation, each equipped with current transformers multiple ratio 100/50/5 A. Also a 66 kV circuit breaker for Childers substation with 3 current transformers multiple ratio 50/25/5 A B.o.T. (Ref.: CRE (IB) 71615/50).*

**Feb. 23.—Buenos Aires.** Water and Electricity Dept. of Argentine Ministry of Industry and Commerce invites tenders for supply and erection of 20,000 kW generating plant. Specifications from Oficinas de Talleres y Suministros, Lavalle 1556, Buenos Aires.

**Mch. 23.—Wellington (N.Z.).** State Hydro-Electric Dept. requires two 350 kVA auxiliary generating sets for Whakamaru power station.

**April 3.—Wellington (N.Z.).** Two tenders by State Hydro-Electric Dept. for supply and delivery of steel-cored aluminium transmission line conductor and accessories for Napier and Christchurch districts. Specifications available at N.Z. Govt. High Commissioner's Office, John Adam St. W.C.2.

**April 3.—Wellington (N.Z.).** State Hydro-Electric Dept. invite tenders for 1-5,000 kVA 110/11 kV transformer bank and spare unit comprising four transformer units each 1,667 kVA 110/6·35 kV, for Waitaki power station. B.o.T. (Ref. CRE (IB) 70084/50).*

**May 1.—Wellington (N.Z.).** Supply and delivery of 12 potential transformers each 63500/63·5 V 500 VA, outdoor type and oil immersed for Maungataper, Edgecumbe, and Hangatiki substations. State Hydro-Electric Dept., Wellington. Specifications from N.Z. Govt. Office, 415 Strand, W.C.2. Deposit £100.

**May 1.—Wellington (N.Z.).** State Hydro-Electric Dept. invites tenders for 570 galvanised steel transmisison line towers for South Island's 220 kV line.

## CONTRACTS PLACED

**Bath.** Electrical installation at Southdown junior school. Burchill and Morgan Ltd., £2,762. **Herefordshire.** Installation of electricity at Ross secondary

## *Your Queries — Answered*

**"Phoenix" vacuum cleaners,** makers of? S.W.—Phoenix Telephone and Elec. Works Ltd., The Hyde, Hendon, N.W.9, whose repair agent is H. Kaufmann Ltd., 11 St. Andrew St., E.C.4. (19184)

**"Sylvester" winches,** makers of? C.C.—Hadfields Ltd., 22 Carlton House Terr., S.W.1. (19171)

**"Lagan" door switches,** makers of? R.S.—Sunderland Forge and Eng. Co. Ltd., Creechurch House, Creechurch Lane, E.C.3. (19176)

**"Bell" inset fires,** makers of? S.E.—A. Bell and Co., Gold St. Works, Northampton. (19179)

**"Ladybird" lawnmower,** makers of ? T.E.—A.M.I. Lawnmower Co. Ltd., 27 Whitcombe St., W.C.2. (19163)

**"Beehive" heater,** makers of? E.B.—Standard Electrical Eng. Co., 16 Heneage St., E.C.3. (19168)

**"Hotric" water heaters,** makers of? S.P.—Originally made by Hotric Ltd., a firm which went out of business about two years ago. Geo. Pearson (Engrs.) Ltd., 208 Chingford Mount Rd., E.4 took over the rights of manufacture, goodwill, etc.; and Metway Elec. Ind. Ltd., King St., Brighton, can supply replacements. (19188)

*The above are selected from questions we have answered this week. If you have a query, send it to us.*

school, Conroy and Owen Ltd., Cheltenham, £6,249.

**L.C.C.** Electrical installation in Langford Rd. School, E. and C. Champion; and same at Rushmore Rd. School, T. Westcott and Sons.

**Morley T.C.** Extension of sodium lighting from Drighlington. General Electric Co. Ltd., £1,752.

**Newcastle (Staffs) T.C.** Electrical installation and wiring houses at Bradwell, Clayton, and Silverdale, Newcastle Electric Co., £1,767.

**Peterborough.** Electrical installation in 104 houses on Eastfield estate. M. F. Hansen, £3,350.

**Plymouth.** Supply of 300 columns and lanterns complete, General Electric Co., Ltd., £3,572; seasonal electrical illuminations, S.W. Electricity Board, £9,500.

**Ramsgate, T.C.** Erection of 54 lamps with fittings on Newington estate, S.E. Electricity Board, £1,668.

**Shoreditch.** Supply and fitment of 400 street lighting lanterns with swan-neck brackets at cost of £1,600, Revo Electric Co. Ltd.

**Torquay T.C.** Electrical installation to 94 houses on Marldon Rd. estate, Electrical and Sound Services Ltd., £3,224.

## PRICES OF CABLE METALS AND OTHER MATERIALS

*(at Monday night)*

| | | New York price |
|---|---|---|
| COPPER, electrolytic | 202 0 0 | £196 0 0 |
| Delivered in 2nd and 3rd month after order | 215 10 0 | — |
| Delivered in 4th, 5th and 6th month after order | 217 0 0 | — |
| LEAD, good soft pig (foreign) | 136 0 0 | 136 0 0 |
| " " " "English" quality | 137 10 0 | |
| Delivered in 2nd and 3rd month after order, plus | 7 0 0 | |
| TIN (99.99.75%) (Cash) | 1225-1230 | — |
| " (3 months) | 1050-1055 | — |
| ALUMINIUM, commercial purity (del.) | 120 0 0 | — |
| ZINC | 151 0 0 | 140 0 0 |
| ARMOURING: | | |
| Galv. Steel Wire (0.104 in.) | 45 10 0 | — |
| Mild Steel Tape (0.04 in.) | 26 0 0 | — |

# GAZETTE ANNOUNCEMENTS

## COMPANIES ACTS

**Tok Switches, Ltd.** Resolution for voluntary winding-up passed at a meeting on Nov. 28. F. W. Charles of Peat Marwick Mitchell and Co., 11 Ironmonger Lane, E.C.2, appointed liquidator.

*Intended Dividend*

**London.** V. S. E. Construction Co., Ltd., radio receiving set manufacturers of 5-7 Denman St., Piccadilly, W.1. Last day for receiving proofs, Dec. 20. Liquidator is Archibald Wm. Hunter, 185-188 High Holborn, W.C.1.

## BANKRUPTCY ACTS

*Receiving Orders*

**London.** Lewis George Stoakes, formerly technical publisher and radio engineer, trading as "Electronicraft Publications" at 45 South Audley St., W.1. Date of receiving order, Dec. 7.

**Leeds.** Philip H. Leach, trading as radio and electrical engineer of 4 Oxford St., Guisley, and 6 Town St., Yeadon. Date of receiving order, Dec. 5.

**Shrewsbury.** James Shelvey, trading as "Vesta-Shelvey Electric Installations," electrical engineers, at Vesta Manufacturing Works, Railway Goods Dept., Oakengates. Date of receiving order, Dec. 7.

*First Meeting*

**Liverpool.** Harold Ward, trading as "H. Ward," radio and electrical dealer, at 104 Aigburth Rd., Liverpool 17. Meeting at Official Receiver's Office, West Africa House, Water St., Liverpool 2, on Dec. 20 at 11 a.m. Public examination at Court House, Fruit Exchange Bldgs., Victoria St., Liverpool 2, on Jan. 16 at 10.30 a.m.

**Leicester.** Neville Leonard Tait, wireless dealer, trading at 19 Church St. Market Harborough. Trustee is Ralph Aylwin Haigh, Court Chambers, Friar Lane, Leicester.

*Order on Application for Discharge*

**Blackburn.** Herbert H. Baron, electrician of 84 Duckworth St., Darwen. Date of order, Nov. 13. Discharge granted subject to bankrupt's consent to judgment being entered against him by Official Receiver for sum of £148 10s. and £1 10s. costs of judgment.

*Release of Trustees*

**Sheffield.** Mrs. Evelyn Whittington, trading as "Modern Electric Service" at Mona Villa Works, Clifton Lane, Rotherham. Trustee, Arthur Tyldesley Eaves, 47 Mosley St., Manchester 2. Date of release, Nov. 24.

# TRADE NOTES

**New Depot.** Thorn Electrical Industries Ltd. are now operating a depot at Craigton Industrial Estate, Barfillan Drive, Paisley Rd. West, Glasgow S.W.2.

**New Year Holiday.** The works of Bruce Peebles and Co. Ltd. will be closed from the evening of December 29 to the morning of January 4, 1951.

**Generators.** Leyland Motors Ltd. and Auto Diesels Ltd., of Uxbridge, have concluded an agreement whereby the latter company will build exclusively a range of high-speed generating sets, incorporating the Leyland engine under the name of "Leyland Auto Diesel."

**Representation.**—Having discontinued their agency agreements some time ago, Bill Switchgear Ltd. have made further appointments to their sales staffs, enabling them to offer representation in all areas. The firm's representatives are: London: A. W. Zelley (manager) and N. Payne, 73 Gt. Peter Street, S.W.1; Birmingham and District: C. Baker (head office); North Midlands: G. H. Garbett (head office); North Western Counties: Manchester Office, 58 Wood Street, Dolefield. H. H. Pollard (manager). Private Address: 22 Grange Road, Bramhall, Stockport, Ches.; South Midlands: C. G. Bachelor (head office); Southern Counties: W. L. White, 94 Shakespeare Avenue, Bath; and Scotland and N. Ireland: J. D. Harris, 47 Netherburn Avenue, Netherlee, Glasgow, S.4.

**Works Extension.** With expanding business, A. B. Metal Products Ltd., have found it necessary to extend their new works at Ynysboeth, Abercynon, Glam., and have acquired an additional factory. The works in Wales now covers an area of 72,000 sq. ft.

# BUSINESS PROSPECTS

## HOME

**Andover (Hants) R.D.C.** Proposed to erect 28 houses on five sites and 12 flats on two sites.

**Atherton (Lancs) U.D.C.** Erection of 6 shops and 5 flats. Architects are J. C. Prestwich and Sons, Bradshawgate Chambers, Leigh.

**Barmouth (Merioneth).** U.D.C. to erect 72 houses on sea front adjoining the two-mile promenade.

**Batley T.C.** Erection of 56 houses and bungalows on Staincliffe estate. Borough Engineer, West House, Hanover Street.

**Birkenhead.** Negotiations in hand for erection of 250 houses on the Woodchurch estate.

**Birmingham.** Erection of 12 flats at Gladstone Rd., and 16 flats and maisonettes at Farm and Grantham Rds., Sparkbrook. Herbert J. Manzoni, City Engineer and Surveyor, Civic Centre, Birmingham 1.

**Brandon U.D.C.** Erection of 78 houses at Ushaw Moor. Council's Surveyor is J. P. Addison.

**Brierley Hill U.D.C.** Erection of a block of municipal offices. Architect and Housing Director, J. R. Moore, Council Offices.

**Brighton T.C.** Erection of 52 flats in blocks of 4 on Coldean estate. Borough Engineer and Surveyor, D. J. Howe, 26-30 King's Rd., Brighton.

**Camelford R.D.C.** Erection of 16 houses on various sites. Architects are Andrew and Randell, Hepworth Chambers, St. Austell.

**Cardiff.** Council to apply for sanction to borrow £185,976 for proposed Howardian grammar school for boys in Colchester Avenue.

**Carlisle.** All trades in extensions to "Cumberland News" building. J. H. Martindale and Son, Architects, Cathedral Chambers, Castle St. Also erection of 90 houses at Harraby Neighbourhood Unit. City Engineer, 18 Fisher St.

**Carlton U.D.C.** Erection of 40 flats in ten blocks on Valley Rd. site. J. R. Campbell, Engineer and Surveyor, Council Hse., Burton Rd., Carlton, nr. Nottingham.

**Carmarthenshire.** Erection of infants' school at Llanstephan. W. T. Lloyd, County Architect, County Hall, Carmarthen.

**Chelsea.** Preliminary plans approved for extension of Chelsea Polytechnic at estimated cost of £81,000.

**Darlington T.C.** Erection of secondary grammar school for girls at Hummersknott. Borough Architect, Central Bldgs.

**Derby T.C.** Erection of new infants' school at Allenton. Borough Architect, The Council House, Corporation Street.

**Dublin.** Erection of 206 houses at Philipsburg Avenue. City Treasurer, Exchange Bldgs., Lord Edward Street.

**Dudley T.C.** Plans approved for erection of 220 houses on Sledmere estate and 26 at Belper Row, Netherton.

**Dunkinfield T.C.** Erection of 36 houses on Yew Tree Lane site. Architects are Cruickshank and Seward, 16 Princess St., Manchester 1.

**Dun Laoghaire.** Erection of 86 houses at Blackrock. Housing and Town Planning Architect, Harbour Hse., Dun Laoghaire.

**Durham.** Tenders are invited for erection of 24 flats in Church St. City Engineer, Town Hall, Durham.

**Erith (Kent) T.C.** Erection of 102 flats at Abbey Wood, S.E.2. John H. Clayton, Borough Engineer and Surveyor, Council Offices, Erith.

**Flintshire.** Application to be made for sanction to borrow £904,844 for new schools and equipment, including over £430,000 for technical school at Kelsterton and £190,502 for modern secondary school at Buckley.

**Harrow U.D.C.** Construction of 24 flats in Kenton Rd. H. W. Rackham, Engineer and Surveyor, Council Offices, Stanmore.

**Henley (Oxon) R.D.C.** It is proposed to build 15 houses at Nettlebed, 12 at Goring, 6 each at Chickenden and Grays Pond and 3 at Woodcote.

**Hitchin (Herts) U.D.C.** Erection of 28 houses on Purwell La. estate. Surveyor, Council Offices, Brand Street.

**Lewisham.** Housing Committee approved scheme for erection of 105 flats in six blocks at Bromley Rd. Architect is E. F. Starling.

**Liverpool.** Erection of X-ray Dept. at Newsham General Hospital for Regional Hospital Board. Regional Architect, Alder Hey Hospital, West Derby, Liverpool 12.

**Liverpool.** Construction of 30 flats and 4 houses at Kirkdale, 18 flats at Prince's St., and 12 flats at Everton. City Architect and Director of Housing, Blackburn Chambers, Dale St., Kingsway, Liverpool 2.

**London.** Approval received for construction of new block at St. James' Hospital for S.W. Metropolitan Regional Hospital Board at estimated cost of £267,000.

**London.** S.W. Metropolitan Hospital Board recommended to approve expenditure of £2,500 for improvement of electric lighting in ward blocks at Southlands Hospital; completion of rewiring the electrical installation at Long Grove Hospital to be spread over next five years, at estimated cost of £19,000.

**Long Eaton (Derby) U.D.C.** Erection of 42 houses on Wilsthorpe Rd. site. Francis Turner, Engineer and Surveyor, Town Hall, Long Eaton.

**Manchester.** Council recommended to approve reorganisation of electric service cable and provision of electrical fire alarm system at Newholme at total cost of £3,700; rewiring of electrical installation, Municipal Hostels, Ashton House, at £1,200; renewal of electric wiring in two homes, Langho Colony, at £1,500; renewal of electric wiring and installation of fluorescent lighting at Bradford Library, Levenshulme and Moss Side, at £1,923.

**Middlesbrough.** Building programme, Green Lane county primary school (£86,240); Brambles-Thorntree primary school (£86,240); and Middle Beck No. 1 secondary school (£148,920).

**Midhurst R.D.C.** Erection of 16 houses and 8 flats on Easebourne site. Council's Architect, T. Greenfield, "Newstead," Midhurst.

**Newcastle-on-Tyne.** Council has received sanction to borrow £157,600 for erection of Blakelaw county secondary school, £446,712 for 296 houses and 12 shops and flats on Montagu estate and 21 houses in Rothley Ave. Also £17,340 for erection of 8 houses on two sites.

**North Riding.** Tenders being obtained for erection of county modern school at Beadlam.
**Northumberland.** Plans approved for county modern school at Wooler. Total cost (with furniture, etc.) estimated at £100,515.
**Offaly.** Erection of 40 houses at Portarlington. County Secretary, Courthouse, Tullamore.
**Portadown T.C.** Approval received for erection of swimming bath at Park Rd., at cost of £82,000, as part of Festival programme.
**Prestwick (Ayr) T.C.** Council to proceed with building of 30 houses on site adjoining Newdykes Farm.
**Samford R.D.C.** Erection of 38 houses at Brantham. Johns and Slater, Architects, 32 Foundation St., Ipswich.
**Seaton Valley.** Erection of 14 bungalows on Village Rd. estate, Cramlington.
**Shardlow (Derby) R.D.C.** Tenders to be invited shortly for erection of 70 houses on Chaddesden site, 80 at Chellaston, 37 at Spondon, and 28 at Borrowash.
**Staffordshire.** Construction of additional classrooms at Rowley Hall county primary school. A. C. H. Stillman, Architect and Surveyor, County Education Committee, Green Hall, Lochfield Rd., Stafford.
**Stafford T.C.** Erection of 16 houses in School La., Rickerscote. T. H. Higson, Borough Engineer and Surveyor, Mount St.
**Stockport.** Erection of infants' school at Reddish. E. Gwyn Thomas, Director of Education, Education Office, Town Hall, Stockport.
**Stoke-on-Trent.** Erection of Springfield and Lyme Rd. county primary schools. City Architect, City Architect's Dept, Kingsway Chambers, Kingsway, Stoke.
**Swanscombe (Kent) U.D.C.** Erection of 20 houses and 16 flats on Manor Rd./Milton St. housing estate. Surveyor is L. E. Croucher, Council Offices.
**Tullamore U.D.C.** Erection of 74 houses. P. O'Faircheallaigh, Town Clerk, Courthouse, Tullamore.
**Wimborne (Dorset).** U.D.C. to erect 16 houses for old people as part of next year's programme.
**Workington.** Electrification of No. 1 mill at a cost of £270,000 is included in improvements scheme to be carried out by the Workington Iron and Steel Co.

# NEW COMPANIES

*Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.*

**Ada (Halifax) Ltd.** To acquire not less than 90 per cent. of issued share capital of Ajax Machine Tool Co., Ltd. Power also taken to carry on business of manufacturers and of dealers in machine tools, plant, machinery, etc. Cap.: £400,000. Dirs.: not named. Subs.: E. H. S. Singleton and A. R. Normand, Trafalgar House, 11 Waterloo Place, S.W.1.

**A. E. Bird (Electrical) Ltd.,** 208 Kent House Rd., Beckenham, Kent. Cap.: £1,000. Dirs.: A. E. Bird and J. F. Bird.

**Frederick Dale Ltd.,** 145a High St., Bromsgrove, Worcs. Electrical and mechanical engineers, contractors and advisers, etc. Cap.: £400. Dirs.: F. T. Dale and Miss J. A. Wensley.

**Ductube Co., Ltd.** To acquire the undertaking and assets of Makeshift Co., Ltd. (incorporated on January 16, 1950, under the style of Ductube Co., Ltd.), and carry on the business of mechanical, hydraulic, constructional, electrical and general engineers, etc. Cap.: £100,000. Dirs.: to be appointed by subs. Subs.: M. J. Venning, Burley House, 5/11 Theobalds Road, W.C.1, and R. G. A. Steel, 8 Cranley Place, S.W.7.

**Electromotives (Croydon) Ltd.,** 14 Florence Rd., Sanderstead, Surrey. Electricians, etc. Cap.: £100. Dirs.: B. D. Parsons and J. T. Bell.

**H. Gregory Ltd.,** 50 St. James St., Burnley. Manufacturers of and dealers in radio, television and electrical equipment, etc. Cap.: £2,000. Dirs.: A. F. Reynard, H. Gregory and A. F. Reynard.

**H. H. Marshall Ltd.,** 4 Great Winchester St., E.C.2. Lighting consultants and manufacturers of and dealers in electrical appliances and apparatus, etc. Cap.: £100. Dirs.: H. H. D. Marshall and K. C. Lindsay.

**Albert Martin and Co. (Clippers), Ltd.,** Avenue Chambers, 4 Vernon Place, W.C.1. Electrical, mechanical, aviation, automobile and general engineers, etc. Cap.: £100. Dirs.: L. G. Wykes, F. G. Stupples, R. H. Denholm and H. W. Lowe.

**Phoenix Telephone and Electric Holdings Ltd.** To acquire not less than 90 per cent. of the issued share capital of the Phoenix Telephone and Electric Works, Ltd. Cap.: £100. Dirs.: not named. Subs.: F. R. Furber and E. Lyall, 18 Austin Friars, E.C.2.

# TRADE MARKS

**Aristocrat,** with design. 689,199. Class 11. Food trolleys and conveyors, all fitted with electric heating media. Metal Commodity Co., 25 Sutherland Ave., Cuffley, Herts.

**Combell.** 691,914. Class 9. Electrical apparatus and instruments. H. Muller, 16 Alexander Rd. South, Manchester 16.

**Dexaloy.** 691,341. Class 9. Electrical apparatus and instruments. N. K. Shaw, 474 Street Lane, Leeds 7.

**Fibrak.** 681,770. Class 9. Separators being parts of electric batteries. Oldham and Son Ltd., 36 Hyde Rd., Denton, nr. Manchester.

**His Master's Voice.** 690,556. Class 7. Washing, drying, wringing, dish-washing, food-mixing and mincing machines, etc. Gramophone Co. Ltd., Blyth Rd., Hayes, Middx.

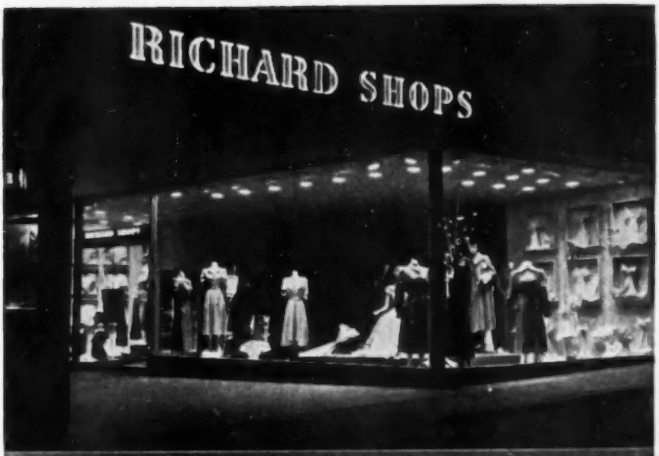
**Memera.** 681,031. Class 9. Electrical apparatus and instruments. Midland Electric Mfg. Co., Ltd., M.E.M. Works.
**R.G.D.** 689,430. Class 9. Television receivers. Radio Gramophone Development Co., Ltd., Pale Meadow Print Works, Hospital St., Bridgnorth.
**Rotomag.** 689,728. Class 7. Automatic magnetic separating machines. Magnetic Separators Ltd., 2/4 Grimshaw St., Liverpool 20.
**Samtilec.** 691,978. Class 11. Electrically-heated towel-rails and electrical heating apparatus. Samuel Timings and Co., Ltd., 88 Hampstead Rd., Birmingham.

# MEETINGS TO NOTE

**THURSDAY, DEC. 28**

A.S.E.E. (Luton Branch).—"Motor Control Gear," R. F. Mathieson. George Hotel, George St. 8 p.m.

I.E.S. (Nottingham Centre).—Brains Trust. Gas showrooms, Parliament St. 5.30 p.m.



**for lighting jobs like these**

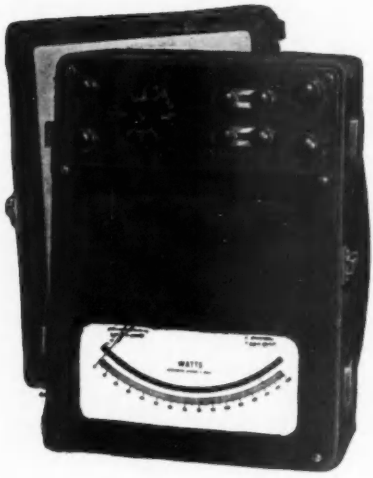
Modern shop premises rewired throughout with Henley Cables
by HENRY BACCHUS LTD. HIGH STREET, BEDFORD.

BY APPOINTMENT
ELECTRIC CABLE
MANUFACTURERS

*Specify* **HENLEY CABLES**

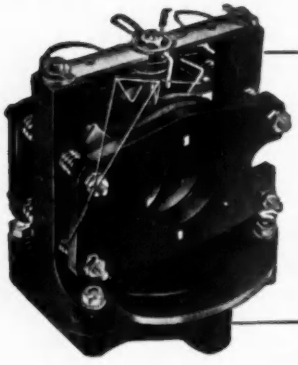
W.T.HENLEY'S TELEGRAPH WORKS CO. LTD. 51-53 HATTON GARDEN, LONDON, E.C.1

FEATURES OF WESTON SUPERIORITY



# *Weston*
## DYNAMOMETER SUB-STANDARD INSTRUMENTS

**This latest development of the well-known 'Weston' sub-standard Wattmeter is made in three models, each of high-grade dynamometer type, designed for a wide range of precision measurements. The standard series is particularly suitable for meter standardisation and for use as a transfer standard between A.C. and D.C. circuits. Type 2 is recommended for low power factor circuits and Type 3 for higher power frequencies. Similar in size and design, each is housed in a lightweight Bakelite case, with easy reading 6″ scale, knife-edge pointer and anti-parallax mirror. The moving element is fitted with spring-loaded jewels, double magnetic shielding is employed and each instrument carries a certificate of individual performance and guarantee of accuracy to 0.25%. Ample voltage and current ranges are available by simple switching which can be safely applied when the instrument is on load. Model S67 (as illustrated). Size 11″ × 9½″ × 6¾″. Weight 10 lbs. (approx.)**



EXTREME RIGIDITY. An unique feature of these 'Weston' models is the self-contained assembly independent of the casing, thus ensuring extreme rigidity. The whole instrument is housed as one complete unit in an attractive Bakelite case with leather carrying strap and detachable cover. Ample shielding and the absence of metal parts eliminate errors due to external magnetic fields and eddy currents.

**SANGAMO WESTON LIMITED**

ENFIELD, MIDDLESEX.

Telephone : Enfield 3434 (6 lines) & 1242 (4 lines) - - Telegrams : Sanwest, Enfield

BRANCHES: GLASGOW, MANCHESTER, NEWCASTLE-ON-TYNE, LEEDS, WOLVERHAMPTON, BRISTOL, SOUTHAMPTON, BRIGHTON, LIVERPOOL AND NOTTINGHAM

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# CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

**Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.**

## TENDERS INVITED

### COUNTY OF LINCOLN—PARTS OF KESTEVEN

KESTEVEN TRAINING COLLEGE, STOKE ROCHFORD HALL, near GRANTHAM, LINCS.

THE County Council is proposing to carry out electrical works at the new hostel at Stoke Rochford Hall in connection with the Teachers' Training College, and invite reputable electrical contractors to indicate their willingness to submit tenders for such work if selected to do so.

Applications in connection with the above should be submitted to the Council's Consulting Engineers, Messrs. E. G. Phillips, Son and Norfolk, of Arskus House, Annesley Grove, Nottingham, not later than January 4, 1951.

Selected firms will be supplied with forms of tender, specifications and drawings.

Tenders must be delivered not later than January 20, 1951, and should be addressed to the undersigned in plain sealed envelopes endorsed "Tender Electricity, Stoke Rochford Hostel." The envelopes must not bear any mark or name indicating the sender.

Any contract entered into shall comply with the standing orders of the County Council, and the council does not bind itself to accept the lowest or any tender.

J. E. BLOW,
Clerk of the County Council.

County Offices, Sleaford, Lincs.
December 11, 1950. (H 153)

### BOROUGH OF ROMFORD

ENGINEER AND SURVEYOR'S DEPARTMENT

THE Council invite tenders for the Electrical Installation to 10 Nos. Shops and 6 Nos. Flats at Gobions Estate, Romford.

The specification and form of tender may be obtained from the Borough Engineer, Town Hall, Romford, on the payment of £2 2s., which will be refunded on the receipt of a bona fide tender and all documents.

Sealed tenders, endorsed "Electrical Installation, Shops and Flats," must be delivered to the undersigned not later than Wednesday, January 3, 1951.

J. TWINN,
Town Clerk.

Town Hall, Romford. (H 167)

## APPOINTMENTS VACANT

### BRITISH ELECTRICITY AUTHORITY

*Yorkshire Division*

CLERK OF WORKS

APPLICATIONS are invited for an appointment as Clerk of Works to be located in the first instance at either Thornhill or Huddersfield power stations.

Applicants should have had a sound experience in heavy building work.

The appointment will be permanent and subject to the provisions of the Authority's Superannuation Scheme.

Conditions of service and salary will be in accordance with the National Joint Board Agreement, Grade 8, Schedule "C". The commencing salary will be within the range £437 to £568 per annum, depending upon qualifications and experience, rising ultimately to a maximum of £622 per annum.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Yorkshire Division, British Electricity House, St. Mary's Road, Leeds 7, to whom completed forms should be returned within 14 days of the appearance of this advertisement. Envelopes to be endorsed "Clerk of Works."

G. A. VOWLES,
Divisional Controller.
(H 172)

### BRITISH ELECTRICITY AUTHORITY

*Merseyside and North Wales Division*

APPLICATIONS are invited for the appointments of three THIRD ASSISTANT ENGINEERS (Protection) for the technical department regional offices in the Liverpool, Wirral and North Wales Districts. Salary £579 rising to £710 per annum, being Class "AX," Grade 5, of the N.J.B. schedule.

Applicants should have completed a recognised training course in electrical engineering and preferably be Graduate Members of the I.E.E. and should have had not less than two years' experience in the commissioning, maintenance and testing of protective and control equipment associated with power stations, also e.h.v. sub-station and transmission equipment.

The appointments are superannuable under the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme and subject to a medical examination.

Forms of application may be obtained from the Divisional Secretary, Clarke Gardens, Woolton, Liverpool, and should be returned to him not later than Monday, January 1, 1951.

A. R. COOPER,
Divisional Controller.
(H 164)

### BRITISH ELECTRICITY AUTHORITY

*South Western Division*

POWER STATION CHEMIST—NEWTON ABBOT POWER STATION

APPLICATIONS are invited for the position of Station Chemist at Newton Abbot Power Station.

Applicants should have a Higher National Certificate in Chemistry as a minimum qualification, and it is essential that they should have had experience in a Power Station Laboratory. Applicants must be familiar with, and capable of, taking part in investigations and performance tests on a variety of plant.

The successful applicant will be responsible to the Station Superintendent at Newton Abbot and will be required to carry out tests, in addition, at the Exeter Power Station.

The salary which should be regarded as provisional and subject to negotiation with such organisations as are appropriate, will be within the range £565–£593 per annum.

Applications, stating age, qualifications, experience, present position and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Clifton, Bristol 8, so as to be received not later than January 8, 1951.

R. C. BARRETT,
Divisional Secretary.

December 14, 1950. (H 191)

### MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPOINTMENT OF THIRD ASSISTANT ENGINEER (BUILDINGS)

APPLICATIONS are invited for the appointment of Third Assistant Engineer (Buildings) in the Construction and Planning Section at No. 2 Sub-Area Headquarters, Sandiway, near Northwich, at a salary in accordance with the revised National Joint Board Agreement Class "K," Grade 10, £646–£674 per annum.

The appointment will be superannuable and subject to medical examination.

The duties of the post include the supervision of new building work and the maintenance of existing buildings throughout the Sub-Area. Preference will be given to applicants who hold a Higher National Certificate in building and who have had experience as a Clerk of Works.

Forms of application may be obtained from the Manager, No. 2 Sub-Area, Merseyside and North Wales Electricity Board, Sandiway House, near Northwich, Cheshire, and should be returned to him in an envelope endorsed "Third Assistant Engineer," so as to be received not later than 5th January, 1951.

JAMES RANKIN,
Secretary.
(H 197)

## BRITISH ELECTRICITY AUTHORITY

*South Western Division*

ASSISTANT TO THE STATION SUPERINTENDENT—BATH POWER STATION

APPLICATIONS are invited for the appointment of Assistant to the Station Superintendent at Bath Power Station.

Applicants must have had a thorough engineering training and experience in power station operation and maintenance.

The salary will be Class "D", Grade 5, £641-£655 per annum, this grading should be regarded as provisional pending confirmation by the National Joint Board.

Conditions of service will be those negotiated by the National Joint Board.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Clifton, Bristol 8, so as to be received not later than 8th January, 1951.

R. C. BARRETT,
Divisional Secretary.

14th December, 1950. (H 192)

## SOUTH WEST SCOTLAND ELECTRICITY BOARD

*Dumfries and Galloway Sub-Area*

SENIOR ASSISTANT (COMMERCIAL)

APPLICATIONS are invited for the appointment of Senior Assistant (Commercial) at Sub-Area Headquarters, Marchmount, Dumfries. Applicants should have wide experience of the utilisation of electricity for domestic, agricultural and commercial purposes, and also of hire and hire purchase transactions, street lighting contracts, supervision of Service Centres, publicity and display, organisation of exhibitions and demonstrations.

Salary and conditions in accordance with the National Joint Council Agreement, Grade 6, £630 by £25 to £705 per annum.

Applications, stating age, present position and full details of experience, to be sent to the undersigned within 14 days of the appearance of this advertisement.

W. H. WILLS,
Manager.

Marchmount, Dumfries.
December 16, 1950. (H 185)

## MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

ASSISTANT SUB-AREA ENGINEER

APPLICATIONS are invited for the appointment of an Assistant Sub-Area Engineer in the No. 4 Sub-Area based on Sub-Area Headquarters, Electricity House, Rhostyllen, Wrexham.

The salary payable will be in accordance with the revised National Joint Board Agreement, Class "H," Grade 3, i.e. £948 to £994 per annum.

Applicants should have a good general and technical education and be Chartered Electrical Engineers. The area is very large and the operations will be widespread over difficult country, involving the control of a large and scattered staff. It is essential that applicants should have considerable practical knowledge and experience of the design, construction, operation, and maintenance work involved in a large distribution system chiefly of a rural nature with voltages from 66 kV downwards. Ability to speak Welsh would be an additional advantage.

The appointment will be superannuable and subject to medical examination.

Applications should be made on forms obtainable from the Manager, Nos. 4/5 Sub-Area, Merseyside and North Wales Electricity Board, Electricity House, Rhostyllen, near Wrexham, Denbighshire, and should be completed and returned to him so as to be received not later than 5th January, 1951.

JAMES RANKIN,
Secretary.

(H 196)

## EAST MIDLANDS ELECTRICITY BOARD

*Spalding District*

APPLICATIONS are invited from suitably qualified candidates for the post of GENERAL ASSISTANT ENGINEER in the Spalding District of the Lincolnshire Sub-Area.

Applicants should have had experience in all branches of distribution work and appropriate technical qualifications will be an advantage.

The salary will be in accordance with the Revised National Joint Board Schedule, Class "C," Grade 9 (£466 to £484 per annum) and the appointment will be superannuable under the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, giving full particulars of qualifications and experience, should be submitted to the manager of the Spalding District, Flax Mill, Pinchbeck, Spalding, so as to reach him not later than January 14, 1951.

P. H. DE KEYSER,
Secretary.

(H 193)

## NORTH WESTERN ELECTRICITY BOARD

*No. 5 Sub-Area*

APPOINTMENT OF FIRST ASSISTANT DISTRICT ENGINEER, BLACKBURN DISTRICT

APPLICATIONS are invited for the appointment of First Assistant District Engineer in the Blackburn District of the No. 5 Sub-Area, at a salary in accordance with the revised National Joint Board Schedule, Class "F," Grade 4, i.e. £767 to £785 to £803 per annum.

The person appointed will be required to generally assist the District Engineer in the construction, operation and maintenance work on the high and low voltage, overhead and underground networks, and sub-stations in the district, including the preparation of schemes and estimates for such system extensions as are dealt with by the District Staff, and to deputise for the District Engineer in his absence. Applicants should have had a wide experience of these duties on supply systems preferably up to and including 33 kV.

Preference will be given to applicants who are members or Associate Members of the Institution of Electrical Engineers.

Applications, stating age, education, qualifications and experience, present post ard salary, should be received by R. H. Harral, M.I.E.E., M.Inst.F., Sub-Area Manager, No. 5 Sub-Area, the North Western Electricity Board, Jubilee Street, Blackburn, not later than Saturday, January 6, 1951. (H 194)

## MUNICIPALITY OF SINGAPORE

ELECTRICITY DEPARTMENT

ASSISTANT DISTRICT ENGINEER, Electricity Department, Singapore Municipality, is required for Permanent Staff. Qualifications: Graduate I.E.E. and experience electricity distribution.

Basic salary scale $440-$370 per month. Starting point according to qualifications and experience. Graduated scale of allowances, e.g. present allowances on $530 p.m. basic are: Expatriation $110 p.m. plus cost of living $186 p.m. for single man or $235.50 for married man, or $301.50 for married man with family. One Malayan dollar equals 2s. 4d. Thus a married man with family on basic salary of $530 p.m. would draw equivalent of £1,318 per annum.

Quarters with heavy furniture provided at 8 per cent. of salary or allowance in lieu. Initial appointment on three years agreement. Eight months leave after four years' service. Free medical attention. Passages paid including family (children under 17). Compulsory Provident Fund Contributions of 7½ per cent. of salary and Municipal Commissioners donate 7½ per cent. rising to 20 per cent. after 20 years service.

Applications in duplicate with full personal and technical information and copies of three testimonials to Messrs. Peirce & Williams (Agents to the Municipal Commissioners), 1 Victoria Street, London S.W.1, before January 23, 1951. (H 189)

## NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

SENIOR ASSISTANT ENGINEER (PROTECTION)

APPLICATIONS are invited for this position, the duties of which will be in connection with commissioning, maintenance and testing of protective equipments in generating stations and main switching stations.

Candidates should be University Graduates, Corporate Members of the I.E.E. and have had wide experience in dealing with modern protection systems for high-voltage plant, including carrier current feeder protection equipments. They should be experienced in short circuit and a.c. network calculations and able to supervise the work of technical staff.

The salary and conditions will be in accordance with the N.J.B. Schedule C, Class "AX," Grade 1, £884 to £1,015. Superannuation is applicable subject to medical examination.

Application form, obtainable from the Secretary, 16 Rothesay Terrace, Edinburgh 3, must be returned within fourteen days from the publication of this notice. (H 165)

## BRITISH ELECTRICITY AUTHORITY

*South Wales Division*

APPLICATIONS are invited for the appointment of STATION SHIFT CONTROL ENGINEER at Upper Boat Power Station, near Pontypridd, at a salary in accordance with the revised N.J.B. Agreement, Class "H," Grade 10 (£571 to £597 per annum).

Applicants should preferably have served a regular apprenticeship, and obtained the Higher National Certificate. Previous experience in the control room at a modern station would be an advantage.

The appointment will be superannuable under the British Electricity Authority and Area Boards' Scheme.

Forms of application may be obtainable from the Divisional Secretary at the address below, to whom completed applications should be returned not later than January 4, 1951, in a sealed envelope endorsed "Station Shift Control Engineer, Upper Boat."

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport,
Cardiff.
December 7, 1950. (H 162)

## LONDON ELECTRICITY BOARD

ENGINEERS (CONSTRUCTION)

APPLICATIONS are invited for the following positions in the Constructional Branch of the Chief Engineer's Department in Central London:

(a) Engineer (Construction) to supervise erection at various bulk supply substation sites within the Board's area, of heavy electrical plant, including transformers and switchgear, at working pressures of up to 66 kV, together with all auxilary equipment. Applicants must have had previous experience of this work both in the factory and in the field. Corporate membership of the Institution of Electrical Engineers and or Institution of Mechanical Engineers would be an advantage.

(b) Engineer (Construction) to supervise the laying, jointing and testing of underground cables, within the Board's area, for working pressures up to 66 kV. Previous experience of such work and of the handling and checking of cable contracts is essential. Corporate membership of the Institution of Electrical Engineers will be an advantage.

Pending grading of the posts under the revised agreement of the National Joint Board, the provisional salaries will be from £650 per annum inclusive in each case, dependent upon qualifications and experience.

Application forms obtainable from the Establishments Office, 46 New Broad Street, E.C.2, on receipt of addressed foolscap envelope to be returned duly completed by January 29, 1951. Please quote Ref. EST V.1094 T on envelope and all correspondence. (H 185)

## SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited from persons who have held a responsible position in the electricity supply or motor industries for the position of SECOND ASSISTANT ENGINEER in the Chief Engineer's Department, at St. Mellons.

Applicants should have had extensive experience in workshop practice. The duties of the position will include interpretation of the Board's transport policy, responsibility for compliance with Statutory Regulations, acquisition of vehicles and specialised plant, standardisation of workshop procedure, control of transport and workshops costs, advising on the lay-out of the Board's workshops and the operation and maintenance of all transport.

The commencing salary will be £752 per annum, rising by five annual increments to a maximum of £884 per annum, in accordance with Class "AX," Grade 2 of the National Joint Board Schedule for the Electricity Supply Industry, and thence upon present classification to Grade 2, Class "CX"—£920 to £938—by two biennial increments.

Detailed applications, stating age, qualifications and experience, both in mechanical and automobile engineering, details of present appointment and salary, together with the names and addresses of three referees, should be submitted to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than January 15, 1951.

D. G. DODDS, Secretary.
(H 195)

## LONDON ELECTRICITY BOARD

ENGINEERING DRAUGHTSMAN

APPLICATIONS are invited for the above position. The successful applicant will be based on the Sub-Area Drawing Office at Romford Road, Stratford, E.15, but may be required to carry out duties in any district of the North-Eastern Sub-Area.

Applicants should have an extensive knowledge of building construction, including design of steel framed and reinforced concrete structures, and be capable of surveying and levelling of sites for sub-station and other buildings.

Pending grading of the post under the national agreement of the appropriate negotiating body, the commencing salary will be not less than £500 per annum inclusive, according to qualifications and experience.

Application forms, obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned, duly completed, by January 1, 1951. Please enclose addressed foolscap envelope and quote ref.: EST.V.1048.T on envelope and all correspondence. (H 163)

## SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the positions of FIRST ASSISTANTS to the District Commercial Managers in District 342 (Merthyr) and District 350 (Bridgend) in the Central Sub-Area of the Board.

Preference will be given to applicants who possess the Higher National Certificate in Electrical Engineering, or its equivalent, and who have had experience in the commercial operations of a District.

The salary for the positions will be in accordance with Class "E," Grade 5 (£662 £678 £694) of the National Joint Board Agreement for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than January 6, 1951. D. G. DODDS, Secretary.
(H 187)

## BRITISH ELECTRICITY AUTHORITY

*South Eastern Division*

VACANCIES exist in the following positions:

(1) ASSISTANT CHEMIST, Divisional Headquarters. Qualifications in chemistry or metallurgy and possession of B.Sc. or A.R.I.C. degrees essential. Experience of analyses of fuels and water, and of boiler fouling problems in modern power stations.

(2) THIRD ASSISTANT ENGINEER, Statistical Section, Divisional Headquarters. A university degree or its equivalent essential, and either manufacturing experience on steam and mechanical power station plant, or operating experience in a modern power station.

(3) ASSISTANT MAINTENANCE ENGINEER (Mechanical), Littlebrook Power Station, Dartford, Kent. Experience essential in maintenance of high pressure turbine and boiler plant and power station auxiliaries. B.Sc. degree preferable.

(4) ASSISTANT ENGINEER (Electrical), Littlebrook. Higher National Certificate standard education required, with experience of power station plant layout and operation. The successful applicant will be responsible for planning plant maintenance.

(5) DRAUGHTSMAN, Littlebrook. Experience of electrical wiring diagrams and mechanical drawing office work necessary. Applicants will be required to work in maintenance section of the power station.

(6) ASSISTANT CHEMIST, Kingston "B" Power Station. Possession of B.Sc. or A.R.I.C. degrees and experience in fuel testing, water analysis and lubricating oils essential. Modern power station experience preferable.

(7) SHIFT CHARGE ENGINEER, Croydon "A" Power Station. Extensive experience essential in operation of modern high-pressure turbine and boiler plant and e.h.t. switchgear and in administration and control of labour.

(8) SHIFT CHARGE ENGINEER, Woking Power Station. Previous experience in operation of power station plant and e.h.t. switchgear essential. Applicants should be Associate Members of the Institute of Electrical or Mechanical Engineers or equivalent.

(9) SWITCHBOARD ATTENDANT, Folkestone Power Station. Experience necessary in the control of switchboards and regulation of supply and loading of plant.

(10) ASSISTANT ENGINEER (Electrical), Brighton Power Station. Higher National Certificate standard education required with practical experience of electrical maintenance and testing of power station plant. The successful applicant will be responsible for inspection of plant before, during and after maintenance or repair work; reports, maintenance records, etc.

Conditions of service and salaries will be in accordance with N.J.B. agreement, as follows:

*(1) Class "AX," Grade 5, commencing £607 19s. per annum.

(2) Class "AX," Grade 5, commencing £607 19s. per annum.

*(3) Class "J," Grade 9, £678 6s. per annum.

*(4) Class "J," Grade 11, £597 9s. per annum.

*(5) £7 to £11 per week dependent upon qualifications and experience.

*(6) Class "G," Grade 10, £565 19s. per annum.

(7) Class "F," Grade 7, £656 5s. per annum.

(8) Class "B," Grade 7, £492 per annum.

*(9) Class "B," Grade 10, £407 per annum. Without prejudice to an agreement to be made nationally as to whether these positions shall be covered by the N.J.B. or the N.J.I.C. agreements.

*(10) Class "H," Grade 11, £538 per annum. These salaries include London allowance where applicable.

*These salaries provisional pending final agreement by the National Joint Board.

Applications, on forms obtainable from Divisional Secretary, B.E.A., S.E. Division, Lower Ham Road, Kingston-upon-Thames, to be returned by January 10, 1951. (H 166)

## CROWN AGENTS FOR THE COLONIES

ELECTRICAL FITTER required by the Nyasaland Government Electrical Services Department for one tour of 24 months to 36 months with prospect of permanency. Commencing salary according to age and experience in scale £570 rising to £865 a year. Cost-of-living allowance between £20 and £126 a year according to salary and dependants. Outfit allowance £30. Free passages. Liberal leave on full salary. Candidates, under 35, must have served an apprenticeship to electrical engineering with a firm of manufacturers or an electricity supply undertaking, and possess some theoretical knowledge. They should be capable of erecting and maintaining low tension and high tension switchgear, transformers, motors and generators, and should have had some experience of overhead or underground distribution work. Preference will be given to candidates who have had experience of electrical supply in a rural area. Some experience of electric welding an advantage.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting M.25647.B on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (H 188

## YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

*Area Board Headquarters, Chief Engineer's Department*

THIRD ASSISTANT ENGINEER (Operation and Construction) Vacancy No. 82/50.

Applicants should possess the Higher National Certificate in Electrical Engineering as a minimum qualification and be Corporate members of the Institution of Electrical Engineers.

The duties will be to assist in the operation of the main distribution system up to 66 kV, including investigation of faults and protection irregularities.

Salary: N.J.B. Schedule C, Grade 5. Commencing salary between £573 and £710 rising to £776 per annum in Class "DX."

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Secretary, Yorkshire Electricity Board, Wetherby Road, Scarcroft, Leeds, within 14 days of the appearance of this advertisement.

*No. 5 (Wakefield) Sub-Area*

INSTALLATION ENGINEER (Castleford District). Vacancy No. 97/50.

The person appointed will be responsible for the organisation and administration of the Installation Section, including the supervision of manual workers, and must be capable of preparing specifications and estimates, dealing with correspondence, carrying out complete installations of all types, and must have a thorough knowledge of the Electricity Supply Regulations and the Institution of Electrical Engineers' Regulations for the electrical equipment of buildings.

Salary: N.J.B. Schedule Class "E," Grade 8, £550/£560 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, within 14 days of the appearance of this advertisement. (H 190)

## SOUTH EASTERN ELECTRICITY BOARD

*Crawley District*

ASSISTANT DISTRICT ENGINEER

SALARY of £492 per annum to £518 per annum under the N.J.B. Schedule, Class "B," Grade 7. Superannuation will be arranged. Applicants should have experience in the design, construction, operation and maintenance of single- and three-phase h.v. and m.v. distribution underground and overhead systems, together with indoor and outdoor type substations including fault location. Duties involve standby.

Applications, giving two referees, must reach F. A. Avery, Esq., Crawley Manager, South-Eastern Electricity Board, 55 High Street, Crawley, by January 6, 1951.

*Worthing District*

DISTRICT COMMERCIAL ENGINEER

Salary £722, rising to £752 under N.J.B. Schedule, Class "E," Grade 4. Superannuation will be arranged. Candidates should be qualified engineers with extensive experience in an electricity commercial department. The District incorporates the former Districts of Littlehampton and Shoreham and has 41,000 consumers. The commercial department covers: Sales (4 showrooms), large contracting department, consumers' service and repair workshop. The person appointed will be responsible to the District Manager for the department, for negotiations for supply and tariffs with all classes of consumer and for commercial statistics and data; he will also be considered for the tenancy of a detached house in the district.

Applications, giving two referees, must reach M. J. Mortimer, Esq., M.I.E.E., Worthing Manager, South Eastern Electricity Board, 56 Chapel Road, Worthing, by January 6, 1951.

A. L. BURNELL,
Secretary.

December, 1950. (H 184)

APPLICATIONS are invited for the position of POWER STATION SUPT. at the Trading Estate Power Station, Slough. Applicants must be fully qualified engineers, having had adequate technical education and practical experience in the administration, operation and maintenance of a steam generating station. The post is a permanent one with a contributory pension scheme. A house will be made available. Salary in accordance with E.P.E.A. Schedule commencing at £935 per annum.—Applications, with particulars of training and experience and copies of recent testimonials, to be addressed to the Chief Engineer, Slough Estates Ltd., Trading Estate, Slough. (H 204)

**BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2**

## *URGENTLY REQUIRED*

## POWER STATION CHARGE ENGINEERS

**by major oil company for service in the Middle East. Applicants must hold at least Higher National Certificate in Electrical Engineering and have had not less than three years' experience in the operation of large modern Steam Power Stations with thorough knowledge of the routine operation of water-tube boilers, turbo-alternators, E.H.T. switchgear and auxiliary plant. Present position in this country should be not less than Grade 8a, Class "H" or Grade 8, Class "G" on N.J.B. Scale. Age not over 35 years. Married accommodation available. Commencing salary not less than £900 per annum PLUS an allowance in the local currency which is liable to variation but which at the present time is equal to £1,400 per annum. Free passages out and home, free medical attention, kit allowance, good leave arrangements, excellent Pension Scheme. Write, giving age, personal particulars, and full details of qualifications and experience, quoting Dept. F.189, to**

**Box No. 2550 at 191 Gresham House, E.C.2**

(E 284p)

A DEVELOPMENT and Research Department of a North West London manufacturing company of repute, is requiring a DRAUGHTSMAN to work in this department with experience of development work on electrical and mechanical designs.—Applications are invited from suitable applicants, who should state full details of previous experience and salary required to Box No. 2015, Electrical Times. (H 154)

APPLICATIONS are invited for a number of vacancies for ELECTRICAL ENGINEERING SENIOR DRAUGHTSMEN for the installation of electrical equipment in large civil and military aircraft. Some knowledge of electronic equipment is desirable and possession of O.N.C. or H.N.C. (Elect.) preferable. The vacancies are for Cricklewood and Radlett (Herts) drawing offices. Further vacancies exist at Cricklewood only for Junior Electrical Engineering Draughtsmen for detailing the above work. The positions offer excellent opportunities for advancement to keen men.—Write, stating age and full details of experience and qualifications, to Staff Officer, Handley Page, Ltd., Cricklewood, London N.W.2. (H 177)

ASSISTANT BUYER required by old-established manufacturing electrical engineers, Manchester.

Applicants should have previous buying experience and first-class knowledge of engineering markets. They should be not more than 35 years of age. Commencing salary about £500 per annum, dependent on experience. Staff pension fund. 5-day week. Full canteen facilities. —Full particulars of age, experience and salary to Box No. 1991, Electrical Times. (H 88)

CABLE FOREMAN required immediately, London area, for 33 kV cable laying, and take charge gang. Must have wide experience.—State age, salary expected, details of experience and references, to Employment and Welfare Manager, Johnson and Phillips, Ltd., Charlton, S.E.7. (H 183)

CABLE Manufacturers require TECHNICAL ASSISTANTS in their construction department, age 20/25. Applicants must at least have qualified to Ordinary National Certificate standard in Electrical Engineering or its equivalent. Also required, Junior Draughtsman, age 25, with some electrical engineering experience.—Apply in writing, giving particulars of qualifications and experience, to Staff Officer, Milton Court, Dorking, Surrey. (H 203)

CONTROL GEAR ENGINEER wanted in the N.E. Able to prepare schemes from customers' requirements. With experience in the design and manufacture of low tension electrical control gear.—Box No. 1999, Electrical Times. (H 104)

COST CLERK required by busy electrical contractors; conversant with pricing stores requisitions, etc. N.-W. suburb.—Box No. 2003, Electrical Times. (H 124)

DRAUGHTSMEN. Britain's leading design consultants and contractors require urgently Senior Switchgear Draughtsmen, also Juniors to train as Switchgear Draughtsmen. Good salaries and prospects of advancement for suitable applicants. Pension scheme.—Write in confidence, quoting reference E.T., to John A. Smith Ltd., 24 Lichfield Street, Wolverhampton. (H 201)

DRAUGHTSMAN having experience in the layout of unit-type low-tension panels and distribution Equipment required.—Apply in writing, stating age, experience and salary required, to the Personnel Officer, W. T. Henley's Telegraph Works Co., Ltd., Gravesend. (H 171)

DRAUGHTSMAN required, preferably with experience in the design of fractional to 5 h.p. electric motors. Varied and interesting work.—Please write, giving full particulars, to Personnel Manager, Small Electric Motors, Ltd., Churchfields Road, Beckenham, Kent. (H 157)

DRAUGHTSMEN with experience on all sizes of power transformers required by company in S.W. London. Pension scheme in operation and five-day week. State full details, past experience, technical education and salary required.—Box No. 2031, Electrical Times. (H 199)

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REPRESENTATIVE required by old-established manufacturers of electric wiring accessories for the Lancaster and Yorkshire areas, on salary, expenses and commission.—Apply, with details of experience, etc., Box No. 1967, Electrical Times. (H 3)

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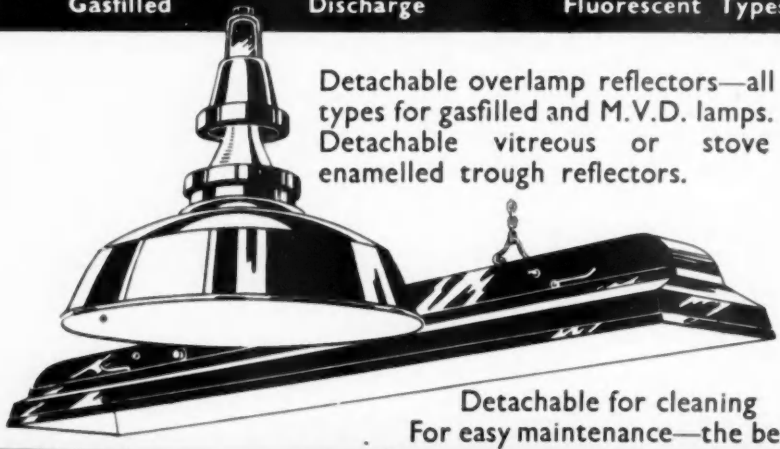

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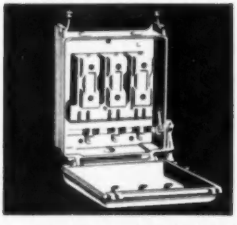

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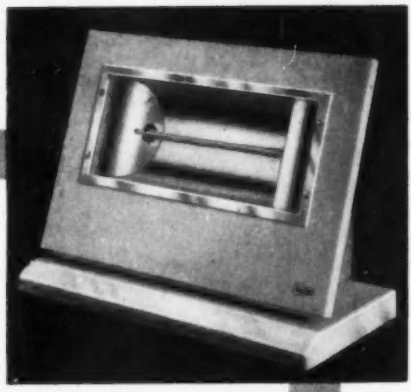

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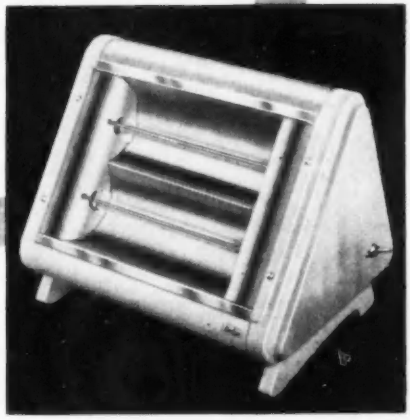

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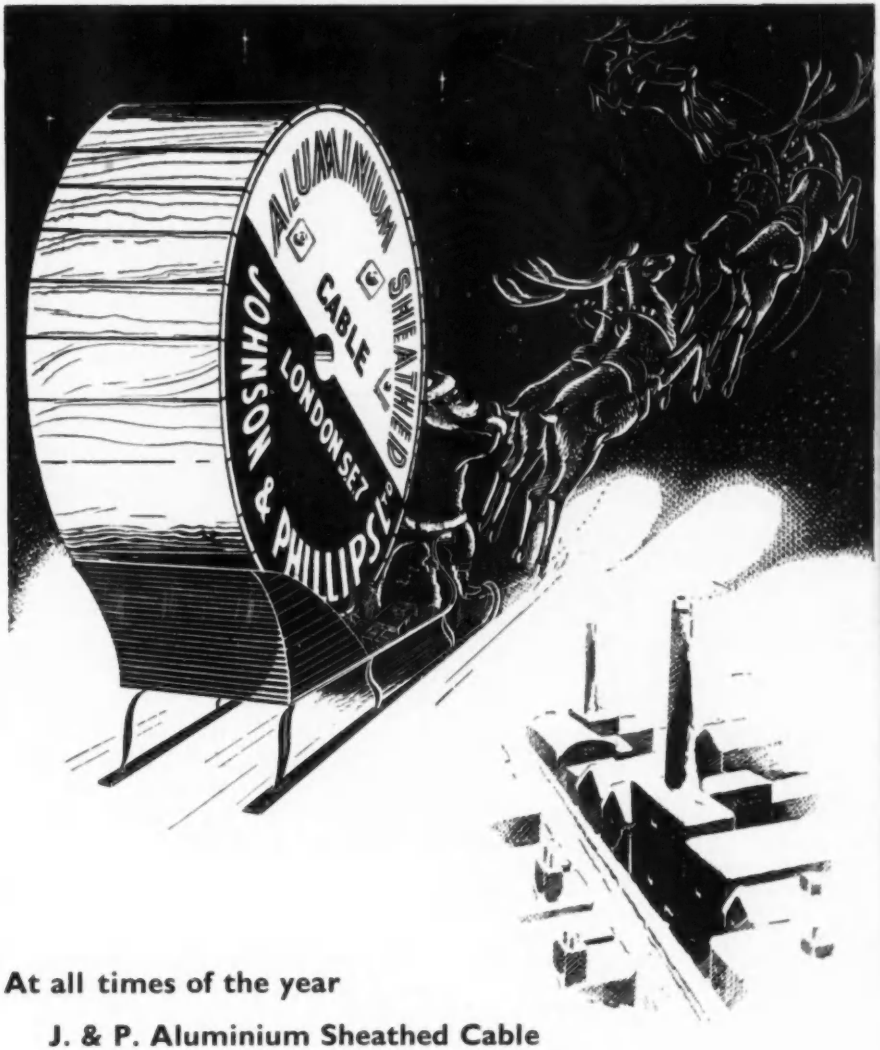


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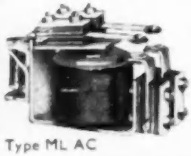

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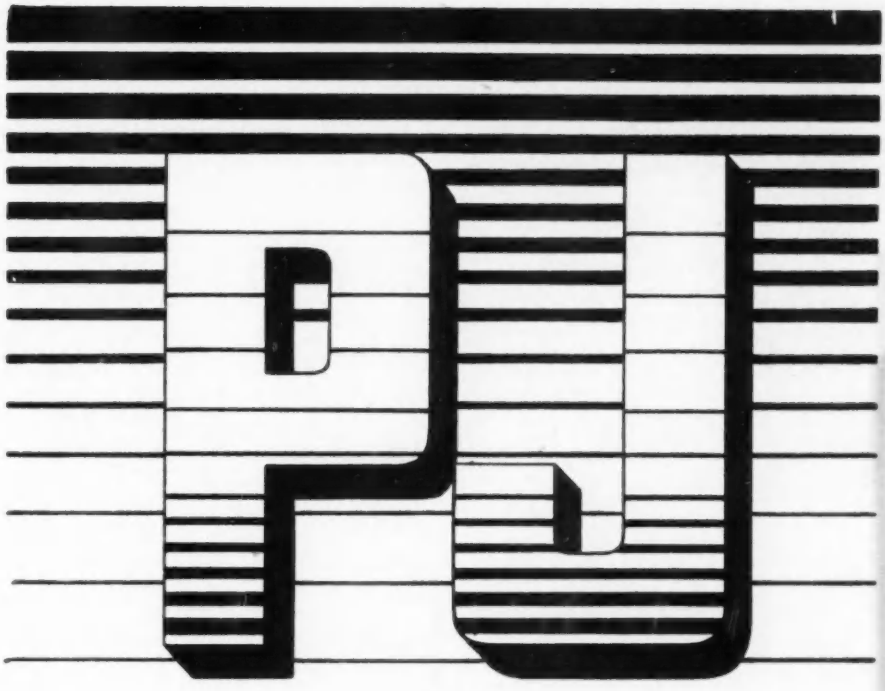


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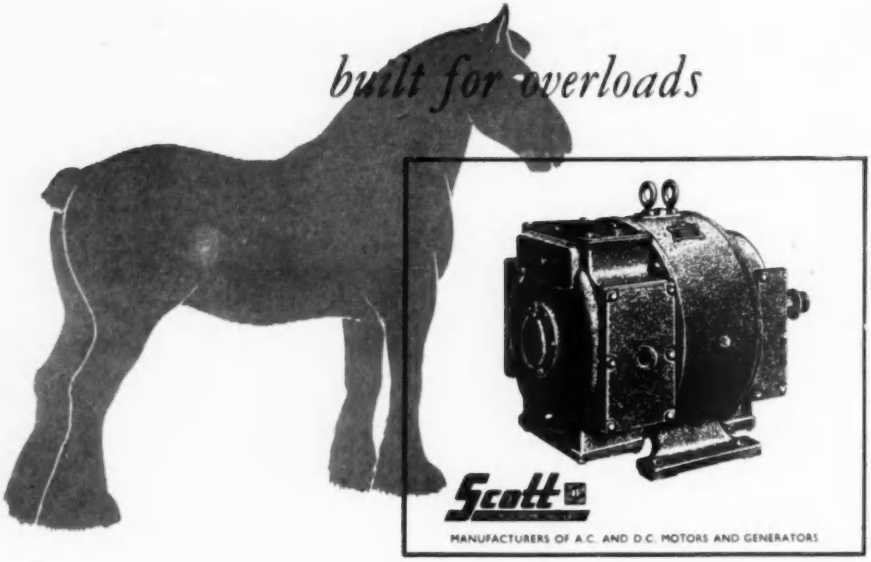

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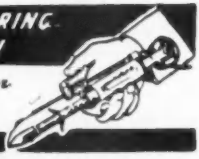

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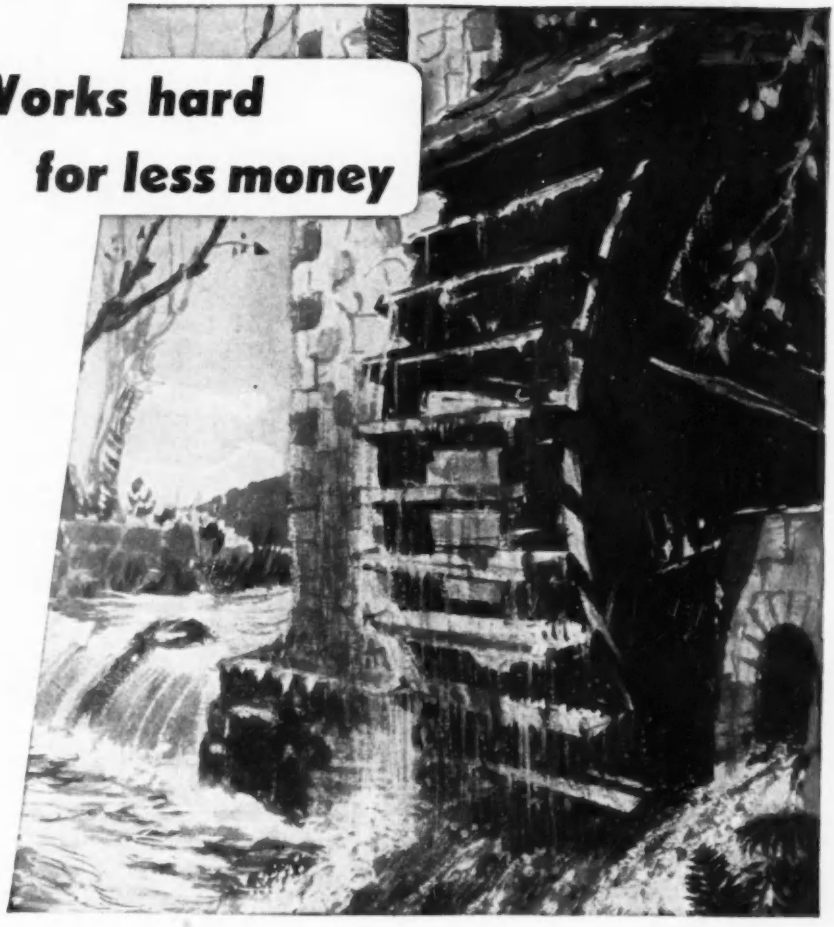

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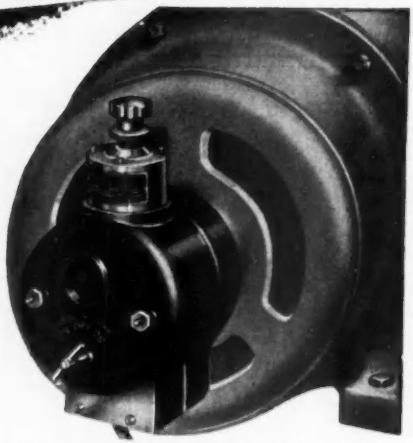

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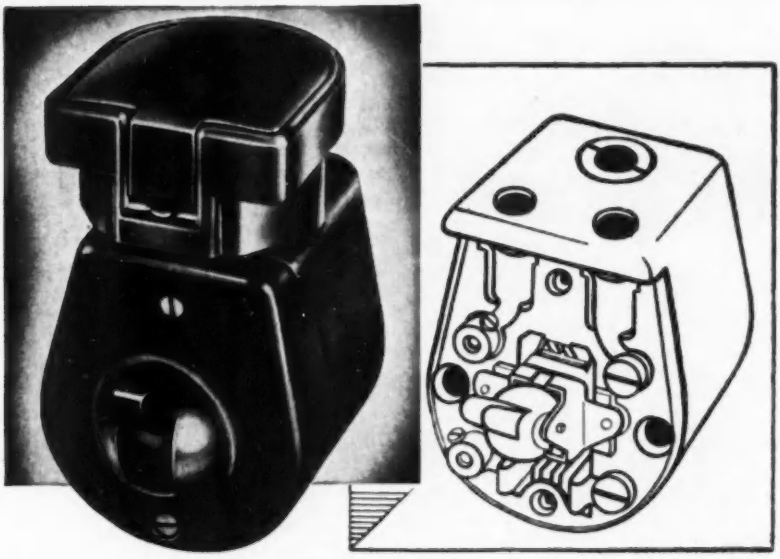

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